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JOURNAL OF

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Vol. 103

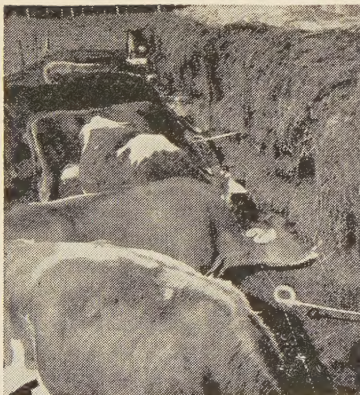
No. 1

15 July 1961

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The Most Critical Feed Period for the Dairy Herd	J. C. Gerring and P. W. Young	2
Lincoln Farmers' Conference		11
Bloom Dipping	J. E. Duncan	17
Nodding Thistle Control in Pastures with Chemicals	E. Delahunty	23
Meteorological Records for May		26
Dairy Produce Graded for Export		26
Equipment for Easier and Quicker Harvesting of Peaches	R. Viney	27
Care of Livestock during August		34
Seasonal Notes		35
New Methods in Cutting and Harvesting Machinery	J. L. Doutre	37
Vegetable Production: Celery	A. G. Kennelly	41
Botrytis Control in Glasshouse Tomatoes	R. A. J. White	55
Bamboo Ladders and Tripods are Easy to Make	J. C. Gerlach	57
Radioactive Materials in Food and Agriculture		61
Round the Research Stations		62
Eradicating Kikuyu Grass by Spraying	P. F. Goulding	65
The Mole Plough and its Function	K. L. Mayo	69
Sodium Chloride as a Partial Substitute for Potassium Chloride in Pasture Topdressing	J. Karlovsky	71
What Do Sheep Eat on Tussock Grassland?	J. M. Hercus	73
Radio Broadcasts to Farmers		77
Town Supply Herds Certified Clear of Reactors to Tuberculin Test		79
Superphosphate Superior to Rock Phosphates for Pasture Topdressing	J. Karlovsky	81
Victorian Experience with Facial Eczema Disease		83
Ditching with Explosives	J. F. Scott	85
The Flower Garden:		
Farm Shelter Can be Attractive	J. S. Say and K. H. Marcussen	90
Garden Work for August	Joy Watkins	95
Sour Cream Cookery	Janet W. Roberts	101
Cardigan in 2-ply or 4-ply Wool		103



Cover

Though modern machinery has reduced considerably the amount of work in making silage, there has been no comparable improvement to ease the heavy and monotonous job of feeding it out. Self-feeding, widely adopted in Britain, may be the solution, but before this can be accepted the method requires thorough investigation under New Zealand conditions. This was begun at the Department of Agriculture's Ruakura Animal Research Station three years ago. Cows are shown feeding from one of the clamps at Ruakura.

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▲ Milking cows strip grazing typical autumn-saved pasture. One acre of such pasture should provide sufficient feed for 70 milking cows for a day.

The Most Critical Feed Period for the Dairy Herd

By
J. C. GERRING,
Animal Research Extension Officer,
and
P. W. YOUNG,
Assistant Animal Research Extension Officer,
both of the Department of Agriculture's Animal Research Station,
Ruakura

ONE of the greatest limiting factors to high dairy production is the way in which cows are wintered and fed during the six to eight weeks before the spring flush commences. In the early stages of lactation cows of good dairy merit are unable to eat sufficient pasture to meet their feed requirements. However, those carrying ample condition can make up for this deficiency by drawing on their body tissues. Most cows lose weight at this time.

For these reasons it is important to have cows in reasonable condition at calving and to feed them fully over the first six weeks after calving. Cows managed in this way quickly reach their peak production, the height of which largely determines the season's yield.

IN a series of studies at the Ruakura Animal Research Station attempts have been made to pin-point the critical feed periods of the dairy herd and to determine the penalties of underfeeding at these times.

These experiments have led to the conclusion that the condition of the cow at calving and its subsequent nutrition in the first few weeks of lactation have a greater influence on the season's production than any other feeding period.

This view has been supported by surveys carried out on a number of above and below average herds in the Waikato basin. Fig.1 illustrates the situation on these farms. Poor production and the early drying off of many cows can be mainly attributed to feeding and management before and after calving rather than poor conditions prevailing later in lactation.

There is a convincing amount of evidence to support the conclusion

that the effect of underfeeding at any particular time depends not only on the dairy merit of the animal, but also on the previous feeding history and, in particular, how it was fed before calving and at the start of lactation.

Feeding Before Calving

A number of trials have shown that extremely low levels of feeding in the last six weeks before calving are most undesirable, leading to yields as much as 60 lb of butterfat below those of cows calving in good condition. This occurred despite the fact that all the animals were fed similarly on pasture from calving onward. The general effect on body condition of such widely differing levels of feeding is illustrated in the photographs at right of a set of identical twins. The poorly fed twins calved down on the average 200 lb lighter in body condition than did those well fed.

There are wide differences in the response of different animals to underfeeding at this time. For example, heifers are probably more adversely affected than mature cows. Mature cows drying off in poor condition at the end of the previous lactation are more likely to be affected than those drying off in good condition. It also appears that certain individual animals may be resistant to underfeeding, or they may be able to secure more than their fair share of the limited feed available.

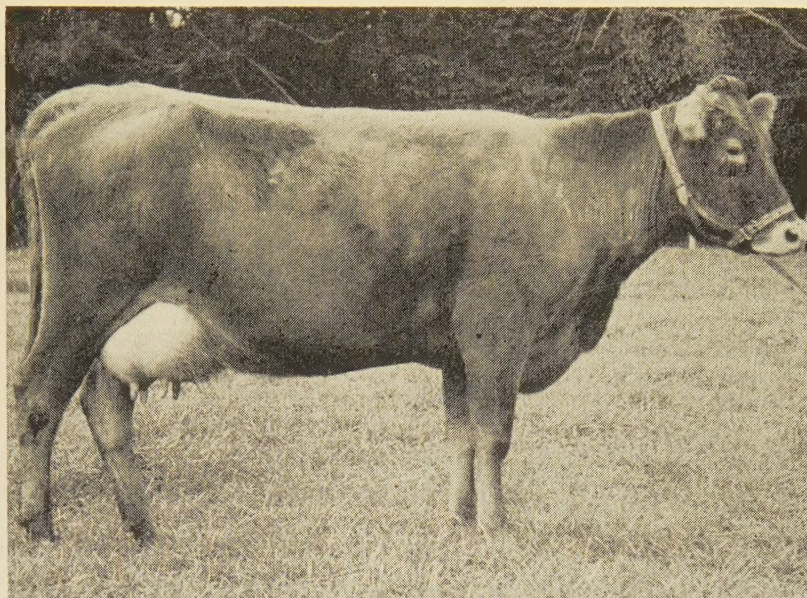
Why is Condition at Calving Important?

Food eaten and digested by the animal is used for a number of different purposes. Part is required to maintain the animal in healthy, active condition at a given liveweight. Another portion may be used for increasing body weight and for meeting the requirements of pregnancy. A further portion is used for milk production.

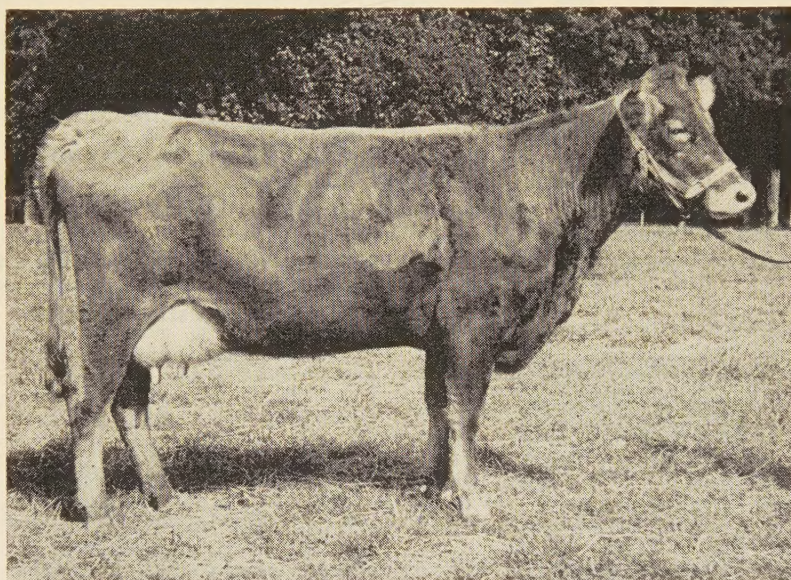
There is active competition between the udder and the other body tissues for these available food nutrients. In early lactation the competitive power of the udder is high, but it declines as lactation advances. The competitive power of the other body tissues, however, depends markedly on the state of the body reserves. The poorer the condition of the animal at calving, the lower are these body reserves and the more strongly will the body tissues compete for the food eaten.

If the cow calves in good condition, competition from body tissues will be low and the udder will be able to secure a much greater portion of the available nutrients. Providing the

FEEDING BEFORE CALVING



These photographs of identical twins illustrate the effect on body condition of low levels of feeding before calving. The poorly fed member (below) calved about 100 lb lighter in body weight than did the well fed twin (above).



animal is of high dairy merit, it will actually be able to use some of its body reserves for milk production.

The relative competitive powers of the various tissues assume greater importance if it is realised that cows have the greatest difficulty just after calving in eating sufficient to meet their requirements. Even under apparently optimum conditions of pasture feeding the animal still has to

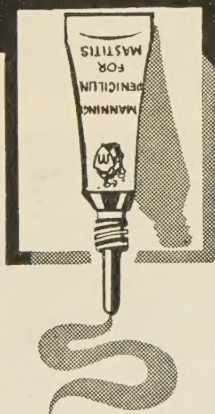
call to some extent on body reserves to maintain a high level of milk production.

This is well illustrated in Fig. 2. Here the well fed animals calving in good condition lost weight for the first six weeks after calving. These animals milked off some of their reserves and produced more milk of a higher butterfat test. In contrast, the poorly fed group had little body reserve to call

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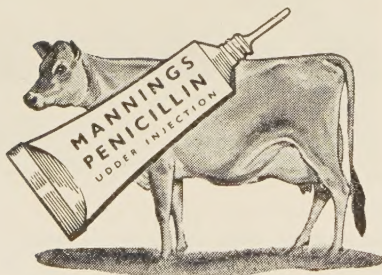
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PENICILLIN UDDER INJECTION KEEPS MASTITIS IN CHECK

At the start of a new season cows should be trained to let down their milk quickly and completely by the establishment of a fixed milking routine, so that the cows are brought into the shed, bailed up, washed and milked in the same way at each milking. A brief but vigorous wash followed by the withdrawal of a squirt of milk from each quarter into a strip cup is the best method of stimulating the flow of milk. This will also help in detecting cases of mastitis early.

When it is remembered that the udder of the cow has become extraordinarily highly specialised by selection and management, it is not surprising that it has also become able to a large number of diseased conditions, Mastitis being one of the most prevalent.

The disease is insidious and animals may harbour the germs for some time before the signs of Mastitis appear. The first indication is usually the presence of small flakes or clots in the fore-milk. These may disappear during a period of temporary improvement, or the signs of an acute Mastitis may appear, namely: heat, pain and swelling of the affected quarter. As the disease progresses, clots in the milk become more obvious and the quarter hardens.

Proper treatment depends on the use of penicillin in adequate dosage, introduced into the udder with aseptic precautions so as not to introduce further (and perhaps more virulent) infection. Full dosage is important as otherwise strains of penicillin - resistant streptococci may arise. The recommended dosage is three 1.5 c.c. tubes of 100,000 units of penicillin, each at 24 hour intervals in the affected quarter.

Treatment of infected cows only may result in quick eradication if the numbers of infected cows in a herd are not large. If the incidence is high however, better and quicker results can be obtained by penicillin treatment of all cows (all quarters), in milk or dry infected or not, at the same time.

on, and, in fact, started to build up body tissues immediately after calving with a resultant loss in nutrients to the udder and a lowered milk production. It must be stressed that both groups grazed together on ample pasture from calving onward.

The substantial differences in production reached in the first few weeks were maintained, though slightly reduced, right throughout the remainder of lactation.

From these experimental results it is quite evident that the condition of a cow at calving has a profound influence on her level of production throughout lactation.

How Well is it Necessary to Feed Cows Before Calving?

In the experiments just described, extreme differences in feeding were imposed. While it is obvious that very low planes of nutrition are most undesirable, it is equally true that very high levels of feeding must seriously limit the number of cows that can be wintered.

A high stocking rate has been shown at Ruakura to be one of the most effective ways of increasing production. The higher the stocking, however, the more critical becomes the normal periods of feed shortage, particularly during winter. For these reasons it is vital to have accurate information on how far the level of feeding during this period can be reduced without seriously lowering production.

In an endeavour to answer this question four groups of identical twins, in good condition at drying off, were fed in such a way that one group was well fed on autumn-saved pasture while the other three groups were fed at progressively lower levels.

The best fed group had access to an area of autumn-saved pasture sufficient to provide all they would eat and still make a reasonable clean-up. The poorest fed group had access to an area 55 per cent of this for sufficient time each day to make a comparable clean-up. Groups 2 and 3 were intermediate between these two extremes. After calving all groups grazed together on good pasture for the first eight weeks of their lactation.

Production differences resulting from these four treatments were small. The biggest difference, that between the two extreme groups, amounted to only 6½ lb of butterfat, a difference which from previous experience could increase to approximately 20 lb over the whole lactation.

From this experiment the important conclusion can be drawn that provided

FEEDING THE DAIRY HERD

FAT PRODUCTION & % COWS IN MILK EACH MONTH IN HIGH & LOW PRODUCING HERDS.

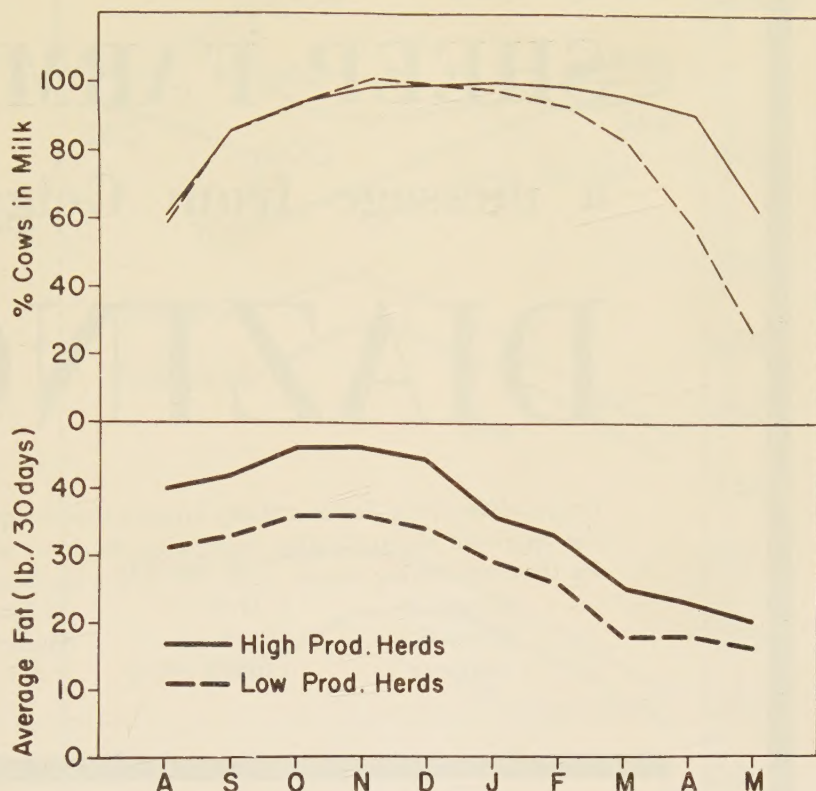


Fig. 1—The situation found in practice on a number of high- and low-producing dairy farms. The lower average production evident from calving onward and the earlier drying off of a high percentage of the herd are mainly due to the way in which the animals were wintered and fed for the first few weeks after calving.

the animals have dried off in good condition from the previous lactation and can be really well fed from calving onward, little will be gained by feeding them more than moderately well during the winter so that they calve down in reasonable condition. In this way the winter carrying capacity can be kept at a high level without serious harm to the following season's production. If the animals have not dried off in good condition, it will be necessary to feed them really well during the last six weeks before calving. In-calf heifers will probably need to be fed better than mature cows during this period, since they are still actively developing.

The nature of the foodstuff fed during winter does not seem to matter greatly. It is the condition of the cow at calving which is important. A comparison has been made between the merits of silage as compared with pasture for conditioning cows before

calving. Animals fed mainly silage with a small ration of pasture calved, at similar weights and body condition to their identical mates fed solely on rationed pasture. After calving both groups produced at approximately the same level. It must be stressed that these animals were in reasonably good condition at the beginning of winter. Had it been necessary to build them up rapidly in condition just before calving, a vastly different picture may have been presented. Under these circumstances pasture allows a much greater weight gain than is possible by feeding mainly silage.

Feeding After Calving

In an experiment at Ruakura identical twins calving in good condition and underfed severely for eight weeks just after calving produced 60 lb of butterfat less than their well fed mates. In the same experiment, where some of the animals calved in poor

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condition, the losses amounted to 100 lb of butterfat per cow. Those animals, underfed after calving only, seemed able to compensate to some extent for their lower level of feed intake by drawing heavily on their body reserves for the first six weeks. They produced less milk with a lowered solid not fat content, but of a higher butterfat test. Those animals which calved in poor condition, however, could draw on body reserves to only a very limited extent. The level of production of these animals depended largely on their current level of feed intake.

The highest-producing animals tended to use the most body reserves and the lowest producers the least. This suggests that the animals of high dairy merit had the greatest difficulty in meeting their nutritional requirements for milk production during this period. If these highly efficient animals are to produce to their maximum level, it is essential to feed them particularly well during this crucial period. This does not mean the inherently low producers should be sacrificed. In some of the Ruakura trials the greatest differences were obtained with low-producing twins simply because the well fed member had a longer lactational length than its poorly fed mate.

Carry-over Effects of Underfeeding

During the eight weeks when the cows were underfed the average loss in production was 20 lb of butterfat per cow. This had increased to 80 lb by the end of lactation, despite the fact that normal feeding was resumed eight weeks after calving. This carry-over effect may be further demonstrated from an experiment at Massey Agricultural College where cows in good condition were underfed severely for only 10 days after calving. This resulted in a loss of 6.6 lb of butterfat per cow during the first three weeks and 40 lb of butterfat per cow over the whole lactation.

These experiments emphasise that the losses incurred during the actual period of underfeeding are only a fraction of the total losses from such a practice. Errors in management shortly after calving, which may cause only a slight, and at times almost unnoticed, drop in production are likely to affect the level of production throughout the whole of the remainder of lactation.

The success of lactation seems to depend on a high level of production being reached in the first few weeks after calving. To reach this high level cows must calve in reasonable condition and be fully fed over the first six weeks. This results not only in a high initial level being obtained, but

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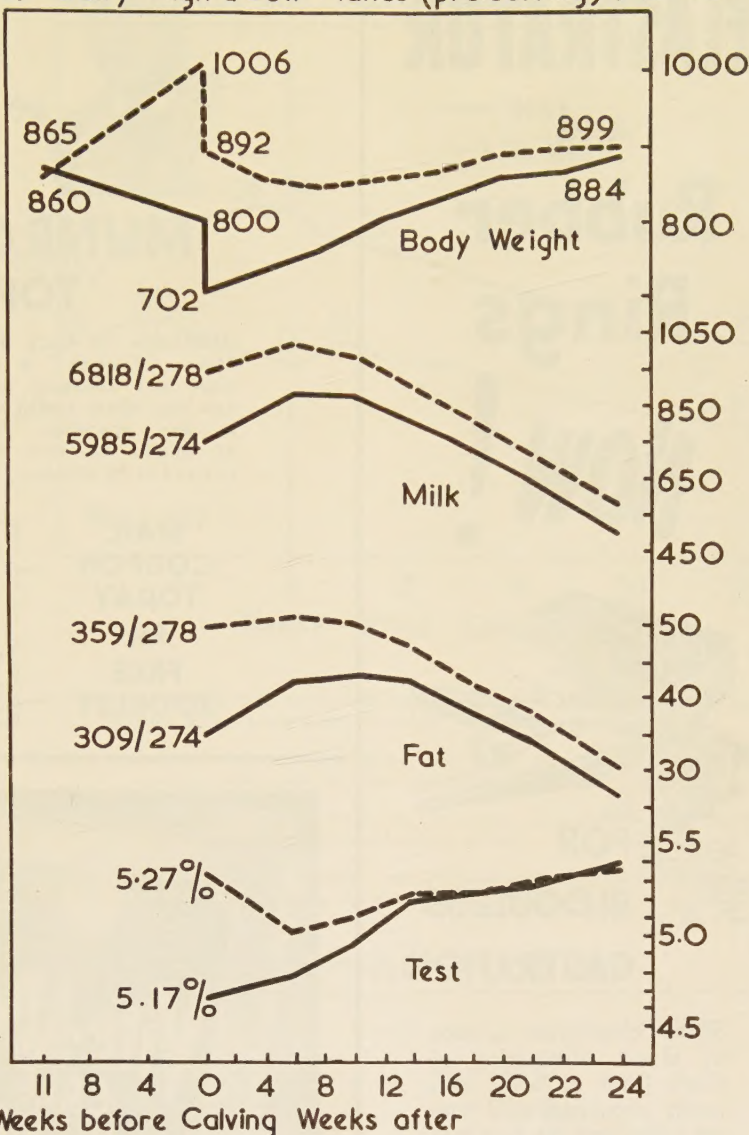


Fig. 2—The weight changes and differences in milk and butterfat production between cows well fed before calving and those poorly fed.

also in many cases a substantial increase in the length of lactation. Dr L. R. Wallace, Assistant Director, Ruakura, suggests that, from a feeding point of view, each day of lactation is more important than the next.

Feed Quality

It has already been stressed that in the early stages of lactation cows have the greatest difficulty in eating sufficient to meet their requirements, even when fed to capacity on apparently nutritious and high-quality pasture. This gap between the nutrients eaten

and the nutrients required must be much greater when the quality of the feed is poor.

Table 1 shows the nutritive value of some common New Zealand foodstuffs, of which pasture, hay, and silage are normally available in the period immediately after calving. Pasture is far superior to either hay or silage for milk production, especially during this period, for two main reasons. Firstly, given the opportunity to eat to capacity, cows can eat considerably more dry matter in the form of pasture than they can as either hay or silage.

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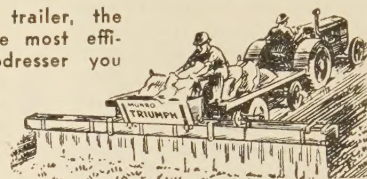
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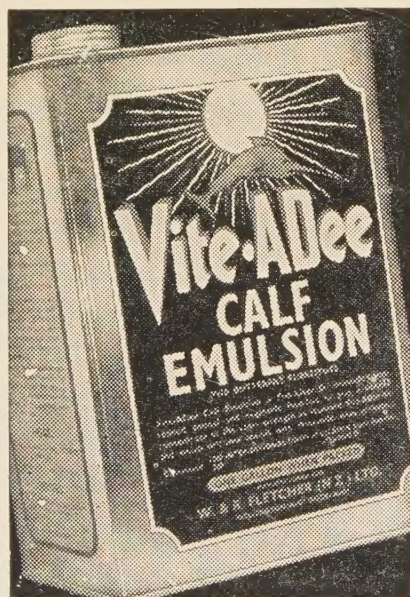
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TABLE 1—NUTRITIVE VALUE OF FEEDS

	Digestibility per cent	Fibre per cent	Protein per cent
Spring pasture ..	75	19	22
Autumn-saved pasture ..	70	20	20
Summer pasture ..	60	20	15
Turnips ..	90	10	12
Kale ..	70	15	16
Lucerne ..	63	30	20
Silage ..	60	35	12
Hay ..	50	35	8

Secondly, the dry matter in the pasture is considerably more nutritious, being highly digestible, higher in protein, and lower in fibre. This may be admirably demonstrated from an experiment conducted at Ruakura some years ago, in which cows were fed indoors for the first eight weeks after calving. Those animals fed entirely on cut pasture consumed approximately one-third more dry matter than those fed only on silage. It may be calculated that those animals fed on pasture received almost twice the amount of nutrients as did those fed only on silage.

From this it follows that the aim after calving should be to provide the cows with a full grass ration. Autumn- and winter-grown and saved pasture, provided it is fed off before it becomes too mature, is an extremely nutritious foodstuff capable of supporting a high level of production. For these reasons and because the spring flush occurs too late to be of real value in the crucial period after calving, autumn- and winter-grown pasture is the best available foodstuff for this period.

Before discussing an actual winter- and spring-feeding programme it would be advantageous to summarise the main conclusions so far and define the major objectives for this critical period.

1. The maximum number of stock must be wintered with the feed reserves available.
2. The cows must be in reasonable condition at calving. Cows drying off in poor condition must be well fed, particularly during the last six weeks before calving. If they have dried off in good condition, there will be little advantage in feeding them more than moderately well so that they do not lose any condition. If the pasture is limited and there is not sufficient to feed both before and after calving, it should be saved until calving has commenced.
3. There must be sufficient high-quality pasture available to feed the herd fully for approximately four to six weeks after calving until the spring flush is sufficiently advanced to supply all the feed requirements.

DIFFERENCES IN MILK PRODUCTION

Average Daily Milk Production – 1st. Expt.

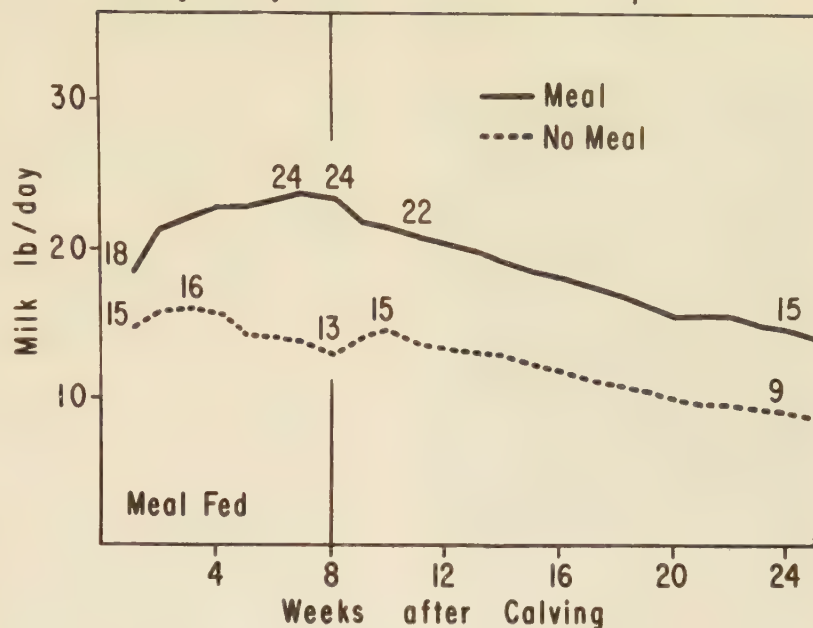


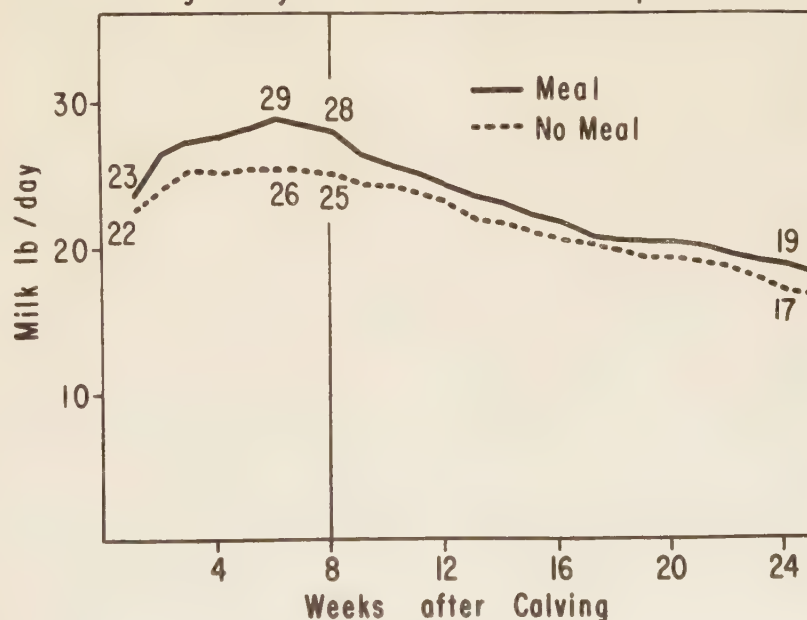
Fig. 3—The differences in milk production between identical twins fed pasture and pasture plus concentrates for eight weeks after calving.

In the first experiment (above) both twins were given only limited amounts of pasture while one member was fed concentrates.

In the second experiment (below) the twins were given abundant pasture during the concentrate feeding period.

After eight weeks concentrate feeding was stopped and the cows were given ample pasture for the remainder of lactation.

Average Daily Milk Production – 2nd. Expt.



Use of Feed Reserves

To make the best use of feed reserves available it is helpful to have some idea of just how much feed there is available at the moment and to what extent this will meet the herd's requirements until spring pasture growth is sufficient.

Though the quantity of feed provided by an acre of autumn-saved pasture is highly variable, it has been the experience at Ruakura that on the average in a normal year an acre of dense, leafy, predominantly ryegrass-white clover pasture, 6 to 8 in. high, closed from mid April to mid June, will provide sufficient feed by itself for 110 to 120 dry cows per day. Cows getting this quantity will actually put on condition and gain 4 to 5 lb body weight per week up to calving. This may be made to last much longer by feeding in conjunction with hay and silage.

To provide a full grass ration for milking cows after calving and still get a reasonable clean-up the same pasture should be fed at the rate of 70 cows per acre per day. In other words, every acre of autumn-winter grown and saved pasture should give approximately 70 milking cow grazing days. At this rate of feeding a minimum of $\frac{1}{2}$ acre per cow would be needed to provide the necessary full grass ration for four to six weeks after calving.

From this it becomes a matter of simple arithmetic to find out how far the saved pasture will go. After allowing for the requirements after calving it will be possible to decide whether any or how much pasture will be available for feeding before calving; or whether it will be necessary to rely almost solely on silage and hay during this period.

Dry pregnant Jersey cattle fed nothing but silage at 70 lb (containing 12 lb of dry matter) per cow per day will just about maintain condition. When this is fed in conjunction with small quantities of pasture (rotationally graze the herd over only one-quarter of the farm) it will actually enable the animals to gain weight at a satisfactory rate up to calving. To achieve this rate of feeding for six weeks a minimum of 1 ton of silage or the equivalent amount of hay per cow is required.

The amount of silage available on the property may be calculated in several ways:

1. By the area of silage cut. An average grass crop cut for silage should yield approximately 5 tons of wet silage containing 1 ton of dry matter. This means that the silage made from an acre of grass should provide

a full maintenance ration for four cows for six weeks and leave sufficient for replacement stock.

2. On a volume basis. The weight of silage varies considerably, but the amount of dry matter in a cubic foot does not vary nearly so much. Thus calculation on a volume basis gives a much easier and better indication of the amount of material actually being fed and present in a stack. One cubic foot of silage normally weighs 45 to 50 lb and contains about 9 lb of dry matter. To supply a maintenance ration of 70 lb of wet silage (or 12 lb of dry matter) it must be fed at the rate of $1\frac{1}{4}$ to $1\frac{1}{2}$ cu. ft. per cow per day.

The methods of calculation outlined give a reasonably accurate and simple way for calculating the amounts of silage and pasture which are available and the number of stock, either milking or dry, that these can be expected to support. If there are going to be insufficient feed reserves of the right type for that critical period before and after calving, it is better to know this at once and be able to plan ahead accordingly. In this way the best use may be made of the supplies which are available and provision may be made to cover the feed deficit. It may be necessary to boost extra pasture growth with nitrogenous manures, to purchase hay, or to graze some of the stock off the property for a short while. Alternatively if calving is rapidly approaching, the use of concentrates may be considered.

Concentrate Feeding

Considerable work has been done at Ruakura on the effect of feeding concentrates at various stages during the season. While this practice has at times given a substantial boost to production, it has been found to be an economic proposition in only a very few instances. Usually the cost of the concentrates is not covered by the extra production, let alone the labour costs involved, even if all the concentrate fed was used by the animal entirely for milk production. With cows on a good grass diet some of the concentrates are used to replace herbage that would otherwise have been eaten, some is used to maintain or increase body condition, and only the remainder is used for milk production.

Under New Zealand conditions payable responses from feeding concentrates can be obtained only if they are fed for very limited periods with a view to reaching high levels of production early in lactation or preventing serious drops in the hope that a reasonably high proportion of the production advantage thus secured will persist after concentrate feeding has ceased. This was admirably demon-

strated in several experiments by Dr Wallace in which concentrates were fed to cows immediately after calving.

In the first experiment 22 sets of identical twins were grazed together up to calving. After calving the animals were still grazed together, but their pasture intake was deliberately restricted and one member of each set was given concentrates at the rate of 6 lb per cow per day. After eight weeks, concentrate feeding was discontinued and all the animals were allowed abundant pasture for the rest of lactation to find out if the production differences induced by the meal feeding persisted. The second experiment was conducted in exactly the same manner except that the cows were all given abundant pasture from calving onward.

The production differences in these experiments are shown in Table 2 and Fig. 3 summarises the experiments graphically.

TABLE 2—AVERAGE DIFFERENCES IN PRODUCTION BETWEEN IDENTICAL TWINS FED PASTURE AND PASTURE PLUS CONCENTRATES FOR EIGHT WEEKS AFTER CALVING

	First experiment	Second experiment
Milk (gals.)		
1st eight weeks ..	40	15
Total lactation ..	148	42
Fat (lb)		
1st eight weeks ..	18	8
Total lactation ..	79	24

From the graphs it will be seen that production differences due to meal feeding were very much greater in the first experiment when grass was in short supply than in the second when abundant grass was available. Feed intake studies revealed that when meal was fed in conjunction with ample pasture the meal-fed twins used some of the nutrients from the concentrates not to boost production but simply to replace pasture they would normally have eaten.

Another major point was that in addition to the production differences induced in the first eight weeks when the twins were actually fed differently, there was a marked carry-over effect during the remainder of lactation, when they were all fed in exactly the same way.

These experiments suggest that if pasture is in very short supply just after calving, it is a payable proposition to feed a heavy ration of high-energy concentrates for a very limited period of two to three weeks. This should force production to a reasonably high level, the advantages of which are maintained over the whole lactation. It must be stressed that meal feeding is recommended only as an emergency practice when insufficient pasture is available during that critical period immediately after calving.

Marketing Questions Dominated

LINCOLN FARMERS' CONFERENCE

A STRONG leavening of agricultural economics in the planned programme of the Lincoln Farmers' Conference at Canterbury Agricultural College, Lincoln, in May stimulated discussion after papers and at informal forums in the evening that had a heavy bias toward international policies, politics, trade promotion, and marketing, to the comparative exclusion of other matters of practical farming interest that were the subject of the balance of the programme.

IMPLICATIONS for New Zealand's primary industry of Britain's possible joining of the European Economic Community, a subject introduced in the opening paper by Mr J. D. Ormond, chairman of the New Zealand Meat Producers Board, in which he reviewed the Board's marketing policy, were discussed again in Professor T. E. Walker's paper on farming in Britain and after Professor B. P. Philpott's paper on economic research into fat lamb prices; and Dr M. M. Burns, Director of the College, who chaired panel discussions in the evening, had eventually to insist that questions deal with matters other than those bound up with the problem of the Common Market.

Forewarning of the need to insist on greater restrictions on the use of agricultural chemicals on farms was given by the Minister of Agriculture, Mr T. L. Hayman, who said that the problem of preventing residues in our exports was not insoluble, but would require firm action by the Department of Agriculture and the exercise of



Mr T. L. Hayman, Minister of Agriculture: A warning of stricter control over the use of agricultural chemicals.

Papers and Speakers

Meat Marketing: Mr J. D. Ormond, chairman, N.Z. Meat Producers Board.

Economic Research on Fat Lamb Prices: Professor B. P. Philpott, Lincoln College.

Trends Affecting Production and Quality Standards: Mr N. H. Law, Meat Industry Research Institute.

Meat Production on the Farm: Mr D. G. Baker.

Beef Cattle on Canterbury Plainsland Farms: Mr P. M. Falconer, Lauriston Farm Improvement Club.

Control of External Parasites: Dr L. K. Whitten, Wallaceville Animal Research Station.

External Parasites of Sheep: Mr H. Doyle, Department of Agriculture, Christchurch.

Farming in Britain: Professor T. W. Walker, Lincoln College.

Economics of Mixed Arable Farming: Mr R. C. Stuart, Department of Agriculture, Christchurch.

Crop Rotations: Mr W. V. Hadfield, Department of Agriculture, Christchurch.

A Mixed Farm at Sheffield: Mr P. Morrison.

Pasture Improvement and Animal Thrift: Dr P. D. Sears, Department of Scientific and Industrial Research, Palmerston North.

Chemical Composition of Pasture and Animal Health: Dr G. W. Butler, Department of Scientific and Industrial Research, Palmerston North.

Intake and Production in Ruminants: Dr A. T. Johns, Department of Scientific and Industrial Research, Palmerston North.

Farm Forestry Species for Various Sites and Purposes: Mr T. Grayburn, Selwyn Plantation Board.

Farm Forestry Utilisation and Financial Returns: Mr A. E. Cooney, Selwyn Plantation Board.



Mr J. D. Ormond: Every reason for full confidence in the sheep industry.

judgment by farmers using new materials for pest control.

Meat Marketing

That there was every reason for full confidence in the sheep industry, which must be expanded, was emphasised by Mr Ormond in his survey of the Meat Board's activities. The marketing of mutton and lamb was New Zealand's particular responsibility, which we could either fail to face up to or accept, as the Board had done, as a challenge to our initiative. The Board was taking the opportunity to establish New Zealand as a specialist, earning a special and continuing place in world markets, and had already gone a long way on this road.

The health of the meat producing industry, said Mr Ormond, could best be maintained if there was maintenance of consumer demand for its products; strong competition among those who trade in its products and among those who transport them and service the industry; reflection of market requirements back to the producer; and favourable international trading arrangements. To maintain the competitive element among those who process and transport the industry's products had been one of the greatest single problems in the Board's policy. The Meat Export Control Act of 1921-22 had given the Board very wide powers which had been a great factor in maintaining stability in the industry.



Mr A. T. G. McArthur, who took up the post of Senior Lecturer in Rural Education at Canterbury Agricultural College, Lincoln, in May, in succession to Professor L. W. McCaskill, who has been appointed first Director of the Tussock Grasslands and Mountain Lands Institute, whose headquarters are at Lincoln. Mr McCaskill has been secretary to the Lincoln Farmers' Conference since its inception and this work will also be taken over by Mr McArthur.

Mr McArthur was Technical Officer of the New Zealand Dairy Board's Herd Improvement Department for five years and before that was on the staff of the Ruakura Animal Research Station. He gained his B.Sc. (Agr.) degree at London University in 1948 and his M.Agr.Sc. from Massey Agricultural College the following year.

"The Board's responsibilities," said Mr Ormond, "are to ensure that the product is produced in quality and in form acceptable to the consumer; hence maintenance and supervision of grading standards and the Board's promotion of a research institute. We are concerned to maintain order and fair play; hence the 'open door' policy, the allocation of shipping space, and the negotiation of freight rates. We must endeavour to maintain and increase the demand for our meat; hence our work in public relations and advertising. We must see that market requirements are reflected back to the producer; hence our constant study and research into market trends and dissemination of news about them. We must maintain as far as possible favourable trading opportunities; hence our concern with negotiations and agreements between Governments. . . . We have to encourage production of types and quantities of meat which it is in our best interest to put on the market, and we must create an environment of healthy competition for livestock."

The Board had enforced the "open door" policy which preserved the right of the owner of livestock to have it slaughtered and the products sold as he wished.

"I doubt if there is any other country in the world where producers of livestock have so many channels open for disposal of their stock. They may use any one of the following: sale in the paddock; sale at auction; sale on the hooks at works (schedule); sale on owner's account; sale through producer cooperatives."

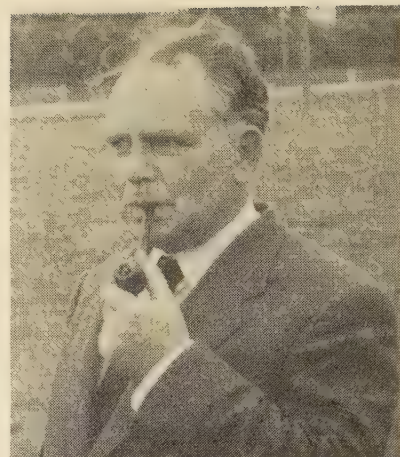
In pursuance of its aim of encouraging production the Board had promoted the establishment of fertiliser works and lent finance to the aerial topdressing industry, with the result that:

Killings of lambs for export had increased from 12.6 million in the 1953-54 season to 18.1 million in the 1959-60 season, an increase of approximately 44 per cent in six years.

Production of mutton in New Zealand freezing works for export rose from 52,616 tons in 1953-54 to 75,000 tons in 1959-60, an increase of 41 per cent.

Production of beef and veal for export rose from 45,737 tons in the 1953-54 season to 84,052 tons in the 1959-60 season, an increase of 84 per cent.

Comprehensive policies of subsidy and support for domestic producers in



Professor T. W. Walker, who after an absence in Britain has returned to the professorship of Soil Science at Lincoln. His paper to the conference on farming in Britain put into perspective aspects of the British farming scene in relation to possible association of Britain with the European Economic Community.

Britain after the war and of protection and price support for agriculture in other industrial countries in Europe had caused increases in livestock production and in the volume of meat being produced round the world that had led to questioning of the wisdom of New Zealand's developing its capacity as fast as it had done, said Mr Ormond. "That idea is folly. Nonetheless, it became clear when rationing ended in Britain in 1954 and private trading resumed that New Zealand must enlarge its marketing horizons. It is a measure of the enterprise of the industry and of the work of the Board that in the six seasons since the end of bulk purchase we have reached the point at which more than 30 markets are regularly taking our meat and about 25 per cent of our total export volume has been sold outside the United Kingdom."

But development of trade elsewhere must be tempered by the primary consideration of maintaining adequate supplies to the United Kingdom, said Mr Ormond, and retaining the competitive position which the quality and promotion of our product have built up. New Zealand was the only large marketer of lamb and mutton and the United Kingdom the only substantial importer of them. The Board certainly believed that beef production should be increased, but that in the main it should be as a part of sheep farming. Beef and veal in the 1959-60 season comprised 23 per cent of export meat and wherever practicable sheep farmers could well increase their cattle numbers. But sheep farming, provid-

Farming Big Business in U.K.

WHETHER subsidies are justified or not, there is no question that farming is big business in Britain today. The total output forecast for 1959-60 was nearly £1,700 million. The two largest items are for milk (£343 million) and eggs (£234 million), followed by pigs (£186 million) and beef (£184 million), with poultry (£89 million) exceeding mutton and lamb (£77 million) in value.

Among the crops wheat (£78 million), barley (£75 million), and potatoes (£70 million) are the most important.

On the input side the figures for feeding stuffs (£427 million), livestock (store cattle from Eire, £52 million), and seeds (£33 million) are for imported products. Of the feeding stuffs some £180 million goes to dairy cows and the rest mainly to pigs and poultry.

The cost of fertiliser (£69 million) is about six or seven times that for New Zealand.

—Prof. T. W. Walker to the Lincoln Farmers' Conference

ing income from both meat and wool, remained the cornerstone of the country's economy, and the fact that the United Kingdom continued to consume 25 lb per head of lamb and mutton could well be the result of New Zealand's consistent supply and promotion over the years.

It was not unreasonable to suppose that if New Zealand had been able to maintain sheep meats as a substantial item in the meat consumption of the United Kingdom, said Mr Ormond, it could do so elsewhere, and the Board was proving the truth of that. Extension

trade. Mr Ormond said that in North America the supermarket was dominant and in the United Kingdom the self-service shop was becoming well established, and an increasing proportion of meat sales would be made in the form of prepared and wrapped cuts.

"There is already increasing demand for cuts to be done in New Zealand, where processors have adapted themselves efficiently to the requirements of the United States manufacturing beef trade. They are making changes also to meet the requirements of an expanding trade in pre-cut meat. This is giving new employment within New Zealand, and so far as it can be economically done here it will be. This is the beginning of revolutionary changes in the meat trade that are being reflected directly back to the works."

The Board, said Mr Ormond, was also interested in processing in works, packaging, and the life of products under various conditions of refrigeration

and transport. The industry and the Board could now bring back technical problems in processing and transport to the Meat Research Institute, whose function was to study the capacity of products to go through the channels of supply to the standards required.

Cash Crops in Canterbury

An estimate that Canterbury's wheat area could in the foreseeable future be increased by more than half without any decline in sheep numbers was made by Mr W. V. Hadfield in his paper on crop rotations in a symposium on the principles, economics, and practice of cash cropping.

Canterbury is today growing three times as much wheat as it was four years ago, and Mr Hadfield discussed the need for farmers to consider carefully where this extra wheat is to be fitted into the cropping programme. Many farmers are ploughing up an old grass paddock and putting it into wheat with little thought to what the

Carelessness with Stock Affects Meat Quality

THE farmer must ensure, when forwarding his beef or lamb for slaughter, that they are in prime condition and in a state which will enable the processor to produce a product in first class condition. A farmer who sends his lambs full and dirty to the works indicates lack of cooperation. The handling of stock before slaughter can affect adversely the quality of the meat. In these days of increasing productivity speedy through-put dominates the scene, and it seems that at times we are unwittingly deviating from those conditions which in the past have been recognised as being necessary to guarantee good meat quality. Stress and fatigue suffered by stock during its handling and transportation to the works for slaughter are harmful, and every effort should be made to move stock carefully.

—Mr N. H. Law to the Lincoln Farmers' Conference

sive market research had shown that future expansion for lamb could be expected in the countries with a high level of prosperity that included the United Kingdom, the United States, Canada, western Europe, and Scandinavia. Between these countries and those on very low level incomes, where there were no present prospective markets for New Zealand meat in quantity, there was a group including Japan, South American countries, the West Indies, and some countries of the Near and Middle East where standards of living have risen enough to enable them to become importers mainly of the cheaper meats, notably mutton. The 1959-60 provisional figure of 16,000 tons of mutton sold to Japan represented 20 per cent of a heavy New Zealand kill, and substantial amounts of beef were also supplied. Lamb trade in smaller quantities was also being developed in about 20 other countries.

Referring to changes that were taking place in the character of the meat



Mr L. W. McCaskill (left) receiving from Mr J. Hunt, for some years chairman of the Lincoln Farmers' Conference, a travelling bag in appreciation of his work in organising and conducting the conference as its secretary since its inception in 1951. Mr McCaskill, who relinquished the professorship in Rural Education at Lincoln to become first Director of the Tussock Grasslands and Mountain Lands Institute, will leave shortly on a study tour of the United States and Britain. Mr Hunt referred to Mr McCaskill's new job of collecting material and making it available to the occupiers of the 13 million acres of tussock grassland that forms the backbone of the South Island. Here the whole set-up was in course of change, and economic conditions would force the adoption of new methods of management.



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LINCOLN FARMERS' CONFERENCE IN THE FIELD



Management of Lincoln's 400-acre arable farm being discussed during the conference field afternoon with (centre) Mr J. H. Oldfield, Field Officer, and Mr J. G. H. White, Lecturer, of the College staff. The farm is run on commercial lines as a two-man unit with emphasis on high net returns from cash crops and small seeds, fat lambs, and winter fattening of wether hoggets. With a third of the farm in cash crops, a third in small seeds, fallow, and lucerne, and a third used for grazing, 1,000 breeding ewes and 250 wether hoggets are being wintered this season.

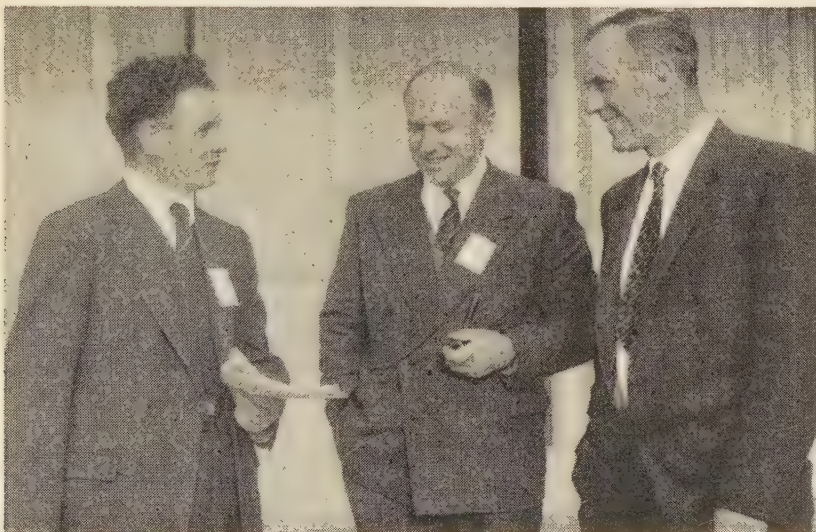
succeeding crop should be. With careful planning to maintain a maximum area of grass for stock, extra cropping could be undertaken and stock numbers maintained at the present level.

Classifying Canterbury cropping soils into three broad types according

to levels of fertility, Mr Hadfield discussed the principles underlying rotations, factors influencing the type of rotation to be adopted, and advantages and disadvantages of those being used.

A safe maximum usage for cash crops was estimated at 30 per cent of the high fertility cropping land, up to

20 per cent of the medium fertility land, and about 8 per cent of the improved light land. These percentages represented a total area of about 300,000 acres, of which wheat could occupy 185,000 acres, with the area in other crops remaining as at present.



Mr P. Morrison, Sheffield, and Messrs W. V. Hadfield and R. C. Stuart of the Department of Agriculture, Christchurch, whose papers illustrated the economic advantages of full capitalisation on the flexibility of the production programme on mixed arable farms.

Room for More at Lincoln Conference

IT was the objective of the committee to get 600 farmers to next year's conference, said Dr M. M. Burns. Though accommodation at the College was limited, and priority would be given to those booking early, there was no quota on bookings for the conference itself.

The profitability of cropping was analysed in a paper by Mr R. C. Stuart, who indicated which crops offered the best returns in Canterbury, and in the last paper of the symposium Mr P. Morrison showed how practical application of the principles on a 320-acre Sheffield farm took maximum advantage of the flexibility of a mixed farm and enabled the harvesting of a wide range of crops and small seeds, the maintenance of maximum numbers of sheep, the build-up of soil fertility, and an average return on investment over five years of 19 per cent.

Services to Agriculture Honoured in Queen's Birthday List

PEOPLE prominent for their services to agriculture who were honoured by having awards conferred on them in the Queen's Birthday Honours List included Mr Alfred Hayward, Mr B. E. Keiller, Mr G. B. Baker, and Dr J. F. Filmer.

KNIIGHT Commander of the Most Excellent Order of the British Empire (K.B.E.)

Mr Alfred Hayward, Kereone, Morrinsville.

Sir Alfred Hayward has been for many years a leading figure in the dairy industry. He has been chairman



[Bock

Sir Alfred Hayward.

of directors of the New Zealand Cooperative Dairy Company Limited for 14 years and will retire from that position in August. After being prominent in New Zealand Dairy Board activities for a number of years he retired from the deputy chairmanship three years ago because of ill health.

An outstandingly successful farmer in the Waikato, Sir Alfred was early a keen exponent of advanced scientific methods, and his practical knowledge of farming and of the dairy industry made his opinions highly regarded.

Companion of the Most Distinguished Order of Saint Michael and Saint George (C.M.G.)

Mr Brian Edward Keiller, of Fitzherbert West, Palmerston North, has held executive office for many years



["Evening Post"

Mr Keiller.

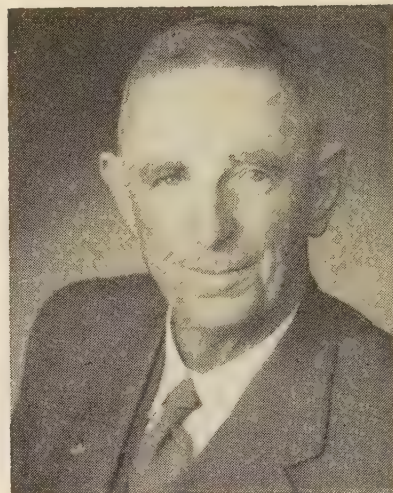
in many organisations concerned with the promotion of better agriculture. They include the Royal Agricultural Society, the Manawatu Agricultural and Pastoral Association, and the New Zealand Pig Producers' Council. He has also served on the Wellington Harbour Board and the Harbour Boards Association.

Commander of the Most Excellent Order of the British Empire (C.B.E.)

Mr George Bartrum Baker, of Timaru, is best known to farmers as the chairman since its inception of the Rabbit Destruction Council. His tenacity in prosecuting the Council's "killer" policy and the success of its application have won him wide respect and appreciation. Increases in production on areas formerly infested with rabbits and improvement in soil cover have been spectacular.

Companion of the Imperial Service Order (I.S.O.)

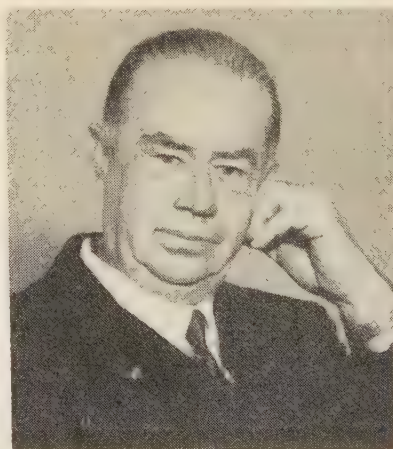
Dr John Francis Filmer was appointed first Director of the Animal Research Division of the Department of Agriculture in 1939 and retired from that position last year. In the organisation and establishment of his Divi-



[Bremford

Mr Baker.

sion, whose work has had a profound effect on livestock production in New Zealand, Dr Filmer showed high qualities as an administrator and a talent for stimulating the research activities of his officers. He was elected an



Dr Filmer.

honorary associate of the Royal College of Veterinary Surgeons in 1954 in recognition of his contribution to veterinary science, and has been an executive member of many organisations concerned with the science and practice of agriculture.

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— J. E. DUNCAN

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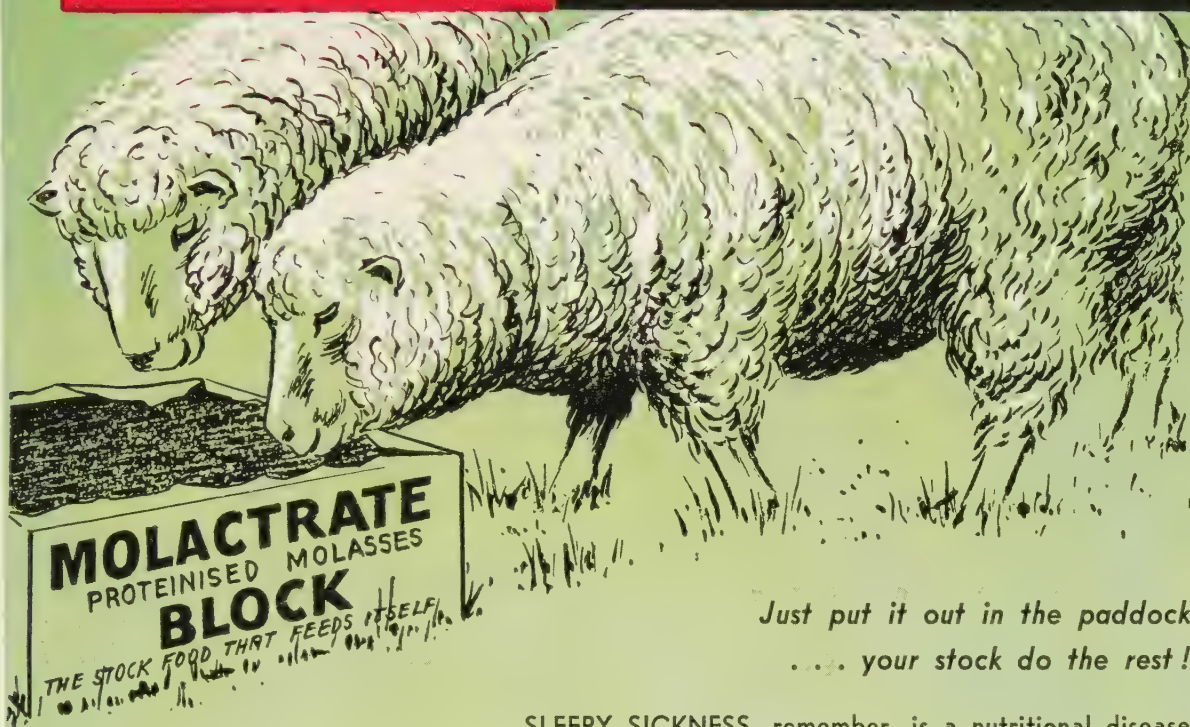
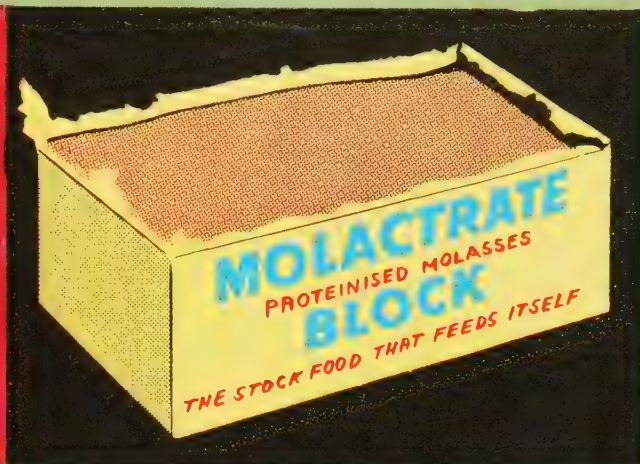
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Nodding Thistle Control in Pastures with Chemicals

FIELD trials over three years in Ashburton County have shown that nodding thistle (*Carduus nutans*) can be readily controlled by timely applications of hormone weedkillers. This article by E. DELAHUNTY, Farm Advisory Officer, Department of Agriculture, Ashburton, discusses the trials and gives control measures based on the results.



▲ Nodding thistle in flower (left) and at the rosette stage (above).

NODDING thistle was first recorded in New Zealand in 1899 in eastern Otago. In 1940 Dr H. H. Allan in his "A Handbook of the Naturalized Flora of New Zealand" (Bulletin No. 83, Department of Scientific and Industrial Research) reported that it appeared occasionally in scattered localities on the east coast of the South Island. During the early 1950s a series of dry seasons hastened its spread, until today it can be found in most east coast areas south of Christchurch and in Hawke's Bay.

It is a biennial with the usual two phases of a biennial: (1) seedling to low growing rosette, and (2) the rise of a main stem, production of flowers, and the setting of seed. Once seed has been set the plant dies. Normally only one main stem is produced, but if this stem is removed without killing the plant (for instance, by mowing), the plant will send up five or six stems in its place. Continued mowing will result in the plant flowering only inches above the ground.

Nodding thistles are tall and stout, the stems are cottony, grooved, and winged for most of the length, and the leaves are deeply cut into many narrow lobes pointing alternately upward and downward. Both surfaces are covered to some extent with short hairs. The flower heads are large (about 2 in.), carrying a drooping, purple flower.

Recommendations

- From the trials nodding thistle appears most susceptible to hormones in autumn and again in spring.
- Spraying should be timed so that the chemical is applied after the seed has struck, but before the thistle has grown into a large rosette.
- For pasture spraying $\frac{1}{2}$ to 1 lb acid equivalent per acre of one of the following applied in either April-May or September is recommended:

The potassium salt of MCPA

The sodium salt of MCPB

The amine salt of 2,4-D (autumn only)

MCPB should be used if there are young clover plants in the pasture

Why is it a Weed?

In the rosette stage nodding thistles can smother out pastures and crops. The rosette can reach a diameter of 5 ft, and therefore can give a dense smother of young pastures, lucerne, and crops.

In midsummer, with the flower stalks 6 ft high, stock are very reluctant to graze thistle-infested pastures.

Thistles can interfere with harvesting of grass seed and cash crops, while thistle spines make hay and wool unpleasant to handle, and their presence will depreciate the value of wool.

1957 Trials

In autumn 1957 three trial sites were selected in different parts of Ashburton County. On one site the thistles were at all stages of growth, but on the other two sites they were mainly seedlings and, with a cold winter, few of these developed into rosettes. The trials gave information on the effect of the weedkillers on clover, but gave little help on weed control.

The quantity of weedkillers applied was based on the hormone content

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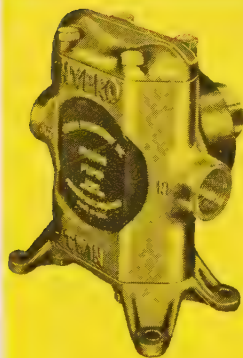
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PISTON PUMPS

BIG TWIN



SMALL TWIN

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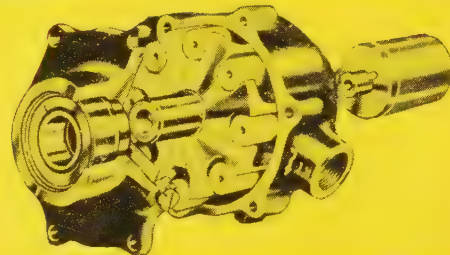
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N1500.

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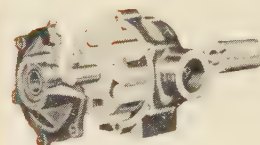
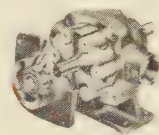
Revolutionary irrigation pump used from the power take off. 2in. pump (roller type), self priming, pumps water in high volume at pressures up to 40 lbs. P.S.I.

B610.

A really capable general purpose pump in high grade cast bronze. Working pressures of up to 75 lbs.

B12.

General purpose pump. Pumps liquids up to pressures of 30 lbs. P.S.I. Just right for home or industrial use.



AUSTRALASIAN DISTRIBUTORS FOR HYPRO ENGINEERING (INC.), MINNEAPOLIS, MINN., U.S.A.

FRANK M. WINSTONE (Merchants) LTD.

AUCKLAND

* PALMERSTON NORTH

* DUNEDIN

P.O. BOX 2195,
AUCKLAND

of a commercially available 2,4-D superphosphate mixture. In foggy weather on 24 May 1957, spray applications were made on separate plots of the potassium salt of MCPA, the sodium salt of MCPB, and the amine salt of 2,4-D, each at 0.6 and 1.2 lb acid equivalent per acre, and 1.0 and 1.5 lb of the sodium salt of 2,4-DB. On the same day 0.6 lb and 1.2 lb acid equivalent per acre of the powdered sodium salt of 2,4-D mixed with aerial superphosphate was broadcast on still more plots. The weather was fine and frosty with no rain for four days after treatment, when 11 points were recorded.

No further treatments were applied until 17 September, when in fine, calm conditions half the plots were re-treated and a new set of plots was given its first treatment. Sodium salt of 2,4-DB was not applied nor was aerial superphosphate in excess of 2 cwt per acre applied to any plot. The weather after treatment remained fine and mild with light frosts; there was no rain for nine days after spraying.

In midsummer the plots were finally inspected. Comments were:

1. Good control of seedling thistles by all treatments.
2. Amine salt of 2,4-D at the heavier rates damaged clover.
3. 0.6 lb acid equivalent per acre of potassium salt of MCPA gave good control with little clover damage.
4. The sodium salt of MCPB gave a slow but complete control.
5. Powdered sodium salt of 2,4-D and aerial superphosphate gave patchy control with the expected response by the clovers to the fertiliser being delayed by up to three months compared with plots treated with aerial superphosphate alone.

1958 Trial

The encouraging results of the 1957 trials led to a decision to do a larger trial in 1958.

In March a young perennial ryegrass-subterranean clover pasture was chosen that had had a moderate infestation of nodding thistles the previous summer. When the trial started there was a dense population of seedling thistles in the two-leafed stage with other thistles in the rosette and flowering stages. The paddock was shut for autumn-saved grass and there was no grazing until late June.

About the middle of each month from April to October separate plots were sprayed at three rates ($\frac{1}{4}$, $\frac{1}{2}$, and 1 lb acid equivalent per acre) of four weedkillers: the potassium salt of MCPA, the sodium salt of MCPB, the sodium salt of 2,4-DB, and the amine salt of 2,4-D. An error in the assumed purity of 2,4-DB used resulted in the application of this material being 50 per cent greater than planned.

Results

One pound of the potassium salt of MCPA gave perfect control in all months; $\frac{1}{4}$ lb was almost as good in April, May, August, and September; $\frac{1}{2}$ lb was variable even in the better months and never gave a complete kill.

One pound of the sodium salt of MCPB was effective in most applications; $\frac{1}{4}$ lb gave good control in the spring; $\frac{1}{2}$ lb was too patchy.

One pound of the amine salt of 2,4-D was good except in June-July; $\frac{1}{2}$ lb was similar except that one or two thistles usually survived; $\frac{1}{4}$ lb was unsatisfactory.

One and a half pound of the sodium salt of 2,4-DB was effective in all but the midwinter months; $\frac{3}{4}$ lb was similar; plots sprayed with $\frac{1}{2}$ lb had too many surviving thistles.

No more than a trace of rain fell within two days of spraying.

1959 Trials

Two trials similar to the 1958 trial, except for the omission of all $\frac{1}{4}$ lb rates and the omission of 2,4-DB from the hormones used, were carried out during 1959.

Poor weather delayed the October treatments until late November.

Both trials were on young paddocks. On one site there were some older thistles in the rosette and flowering stages when the trial was begun in April; there was a heavy strike of thistle seed in the early autumn with a dense cover of small rosettes on both sites.

Results

In both trials clover damage was less marked with the sodium salt of MCPB, but never severe with any treatment.

The application of 1 lb of any of the three weedkillers in April or May gave perfect control.

The $\frac{1}{2}$ lb rate in April-May was not quite as good, but still gave good control.

The potassium salt of MCPA was

NODDING THISTLE



Nodding thistles spread from seed, which is readily dropped from the down, generally within inches of the parent plant; a few seeds scatter further. One nodding thistle plant may produce as many as 7,000 seeds; so don't let a nodding thistle flower!

effective at all times except June and November.

The amine salt of 2,4-D was unsatisfactory except in April, May, and September.

The sodium salt of MCPB gave good control in April-May, moderate control in September, and was unsatisfactory in other months.

Discussion

Seedling nodding thistles are readily killed by light rates of hormone weedkillers. The strike of seed seems to occur mainly in autumn, so spraying in late autumn should control this easily and cheaply.

Once a thistle has been sprayed the leaves become very palatable to stock and are readily eaten to ground level. A young thistle cannot recover from this defoliation, but older thistles with a better developed root system produce a typical tight cluster of regrowth and recover completely.

Control is easiest in the growing months of autumn and spring. Some hormones will give a measure of control in midwinter, others are ineffective in cold weather.

Chinese Gooseberries an Increasingly Popular Fruit

BECAUSE Chinese gooseberries ripen in winter and are rich in vitamin C, they are a valuable addition to the family diet at a time when varieties of other fruits are limited. New Zealand housewives are becoming increasingly aware of these qualities, and a growing demand is reflected in the continuing increase of the quantity of this delicious fruit produced commercially, mainly in the Kerikeri, Auckland, and Tauranga districts. As the vines will thrive in home gardens in most North Island districts, and even in some South Island areas if planting is confined to positions protected from frosts and cold winds, home orchard production is also increasing.

Under favourable conditions the Chinese gooseberry vine is a vigorous grower, and if not properly controlled, can become very large and tangled and give an inexperienced grower considerable trouble.

If vines are properly trained from the start on to well made supports, growers will be able to maintain the plants easily and should get prolific fruiting.

The increasing interest in the fruit and the need for good management of vines have caused the Department of Agriculture to issue a considerably revised version of Bulletin No. 349, "Chinese Gooseberries: Their Culture and Uses". The bulletin, which is illustrated, has concise yet comprehensive descriptions of all main aspects of production from selection of vine sites and varieties of fruit to harvesting, storing, and packing. As the fruit has various culinary uses, the bulletin includes some recipes.

It can be bought for 1s. a copy at all main offices of the Department of Agriculture.

CHANGE OF ADDRESS OF "JOURNAL" SUBSCRIBERS

To ensure continuity of delivery of issues of "The New Zealand Journal of Agriculture" subscribers are required to give four weeks' notice of change of address. The old address (preferably an address label clipped from a recent "Journal" wrapper) and the new address should be sent to the nearest office of the Department of Agriculture. This notification should be made in addition to any given to the Post and Telegraph Department.

Meteorological Records for May

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches				Bright sunshine hours	
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount		Date
Kerikeri	240	55.6	—0.7	70.0	39.1	5.03	15	—2.4	1.46	7	152
Auckland	160	57.4	+0.8	67.7	45.6	5.40	17	+0.6	1.61	5	163
Tauranga	12	53.6	+0.0	68.6	33.3	8.35	14	+3.5	4.16	6	174
Ruakura	131	51.6	+0.2	68.7	29.8	2.57	19	—1.7	0.47	5	145
Whakarewarewa ..	1,006	50.1	+0.9	64.8	32.8	3.81	10	—2.1	0.97	15	144
Gisborne	14	53.1	+0.2	67.6	31.1	3.76	17	—1.2	1.03	7	151
New Plymouth ..	160	54.6	+0.9	68.5	37.4	7.47	17	+2.2	1.13	12	147
Karori	2,125	45.8	+0.3	63.2	27.2	1.65	9	—2.6	0.85	30	
Napier	5	52.2	—0.6	69.2	33.9	2.92	12	—0.9	1.38	14	134
Wanganui	72	52.2	—0.8	69.6	35.9	1.31	9	—1.8	0.57	30	130
Palmerston North ..	110	51.8	+0.8	68.3	33.0	2.41	11	—1.1	0.74	30	122
Waingawa	340	49.0	—0.5	66.1	29.5	5.75	14	+1.7	2.34	6	126
Wellington	415	51.2	—0.1	64.9	37.8	2.33	16	—2.4	0.64	13	139
Nelson airfield ..	5	50.1	+1.6	65.1	29.8	2.40	8	—1.0	0.87	11	170
Blenheim	14	50.1	+0.5	68.9	32.2	1.81	8	—0.8	0.83	11	179
Hanmer Forest ..	1,270	43.9	—0.9	66.5	25.0	7.23	13	+2.4	2.15	12	123
Hokitika South ..	15	49.4	+1.2	65.0	32.0	3.73	15	—5.3	0.66	18	104
Christchurch ..	22	47.1	—0.5	63.8	29.0	3.80	13	+0.8	1.21	11	120
Ashburton	323	46.3	—0.4	68.0	26.6	4.94	13	+2.4	1.40	12	115
Timaru	56	47.0	+0.2	69.2	29.9	3.77	15	+2.1	1.33	23	96
Alexandra	520	42.2	—0.7	67.3	23.5	0.06	4	—0.8	0.03	21	120
Tairā	80	44.4	—1.5	66.5	27.2	0.86	11	—1.4	0.27	18	102
Invercargill airfield	0	45.0	—0.3	63.5	24.1	3.88	16	+0.2	0.70	21	98
Chatham Island ..	150	50.1	—0.5	60.2	37.4	2.87	21	—0.5	0.58	27	80

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during April 1961 and for the nine months ended 30 April 1961 with comparative figures for the same month and the nine months of 1959-60 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

Period	BUTTER			Percentage inc. or dec.
	Creamery (tons)	Whey (tons)	Total (tons)	
April 1961	6,848	236	7,084	—
April 1960	7,959	207	8,166	—
Increase or decrease ..	-1,111	+29	-1,082	-13.250
9 months ended 30/4/61 ..	159,236	3,019	162,255	—
9 months ended 30/4/60 ..	155,464	2,852	158,316	—
Increase	+3,772	+167	+3,939	+2.488

Butter in store at 30 April 1961 was 36,510 tons

Period	CHEESE			Percentage increase
	White (tons)	Coloured (tons)	Total (tons)	
April 1961	5,410	1,508	6,918	—
April 1960	4,254	1,288	5,542	—
Increase	+1,156	+220	+1,376	+24.828
9 months ended 30/4/61 ..	75,548	11,612	87,160	—
9 months ended 30/4/60 ..	71,369	11,077	82,446	—
Increase	+4,179	+535	+4,714	+5.717

Cheese in store at 30 April 1961 was 26,103 tons

If these figures are converted into butterfat equivalent, there is an increase of 3.102 per cent in butterfat graded for the nine months as compared with the preceding season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese used on the local market and other products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

Growers Devise Equipment for Easier and Quicker Harvesting of Peaches

EQUIPMENT which speeds up the harvesting of peaches and also makes handling of the crop much easier has been devised by Glucina Bros., Hobsonville, near Auckland, who have 30 acres of peach trees. It is described by R. VINEY, Horticultural Instructor, Department of Agriculture, Auckland.

THE orchard is of about 50 acres devoted to stone fruit growing. A rotational method of replacing blocks of trees as they become unprofitable is practised and about 30 acres of trees are always maintained in good growing condition. Trees for replacement are propagated on the property.

Of about 6,000 peach trees at present on the orchard, the majority are mid-season varieties with Carman, Wiggins, Stark, and Paragon predominating. The entire crop is packed for the Auckland market and a specialty is made of carefully harvesting, grading, and packing peaches for the dessert trade.

Advantages of This Harvesting System

ADVANTAGES of the system are:

- Easy and speedy handling of full and empty cases.
- Harvested fruit is well ventilated and shaded.
- Levelling cases of fruit after harvesting is eliminated.
- A good supply of fruit for the packers may be kept on hand without any additional handling or stacking.
- Handling of full and empty cases is kept to a minimum.
- No dirt or mud gets on cases.
- Picking from ladders is kept to a minimum.
- Stooping is practically eliminated.

It is considered that a saving of at least 25 per cent of the labour for picking and packing each day has resulted from the use by Glucina Bros. of the equipment described.



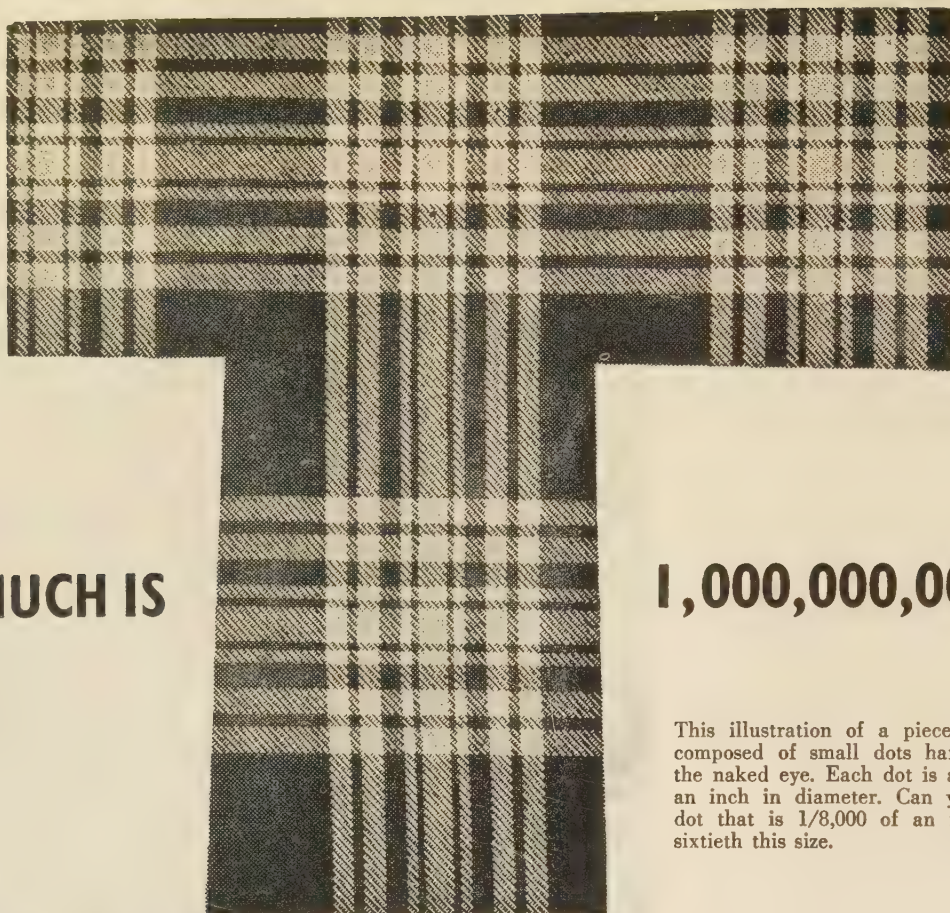
Fruit is harvested directly into 7 in. x 7 in. peach cases. Some pickers use straps which clip on to the ends of cases and others prefer to use picking aprons as case holders.

All grading and packing need to be very carefully done by hand, as the fruit is picked too mature to be machine graded.

As mid-season varieties predominate, harvesting has to be carried out over a very short period. With the large quantity of peaches to be handled in a short time, any hold-up either in harvesting or packing can result in fruit becoming overripe and unfit for market. Because of the lack of facilities in the past to handle the crop rapidly, much of the fruit has gone to waste.

As a result of much thought and the observation of ideas of other orchardists, Glucina Bros. have devised a trailer unit which, with alterations to their packing shed layout, has proved effective this past season in considerably speeding up harvesting and packing. Some minor modifications became evident as the result of experience and will be adopted before next season.

One 3-tier and five 2-tier trailers were used when harvesting and a feature of these is the three roller conveyer units on each tier. Each of the three sections of a conveyer unit holds nineteen 7 in. x 7 in. cases, which means that 57 cases can be carried on each tier. Planks placed along the tops of the trailers formed convenient platforms from which most of the fruit



HOW MUCH IS

1,000,000,000,000

This illustration of a piece of Tartan is composed of small dots hardly visible to the naked eye. Each dot is about $1/130$ of an inch in diameter. Can you imagine a dot that is $1/8,000$ of an inch? — one-sixtieth this size.

COLLOIDAL REDUCTION

$1/8,000$ of an inch is the average size of the particles dispersed in TARTAN FENODREN, phenothiazine drench. This size is so small that a pound weight could contain 1,000,000,000,000 (million-million) particles. It is achieved by a process called "Colloidal Reduction", developed by Farm Chemicals Co., Nelson, and patented in this country and overseas.

The "Colloidal Reduction" process is exclusive to TARTAN Sheep Dips and Phenothiazine Drench in liquid form.

It is an accepted fact that the finer the particles to which a chemical is reduced, the faster and more effective its action will be.

More effective because they're finer

TARTAN
FARM CHEMICALS

TARTAN Fenodren Drench
TARTAN Sheep Dips
TARTAN Sheep Dusts
TARTAN Jetting Solution
TARTAN D.D.T
and many others.

DISTRIBUTORS: (North Island) SUMMIT PRODUCTS LTD., Palmerston North.
(South Island) A. S. PATERSON & CO. LTD., Nelson,
Blenheim, Christchurch, Timaru, Dunedin, Invercargill.

PRODUCTS OF THE FARM CHEMICALS COMPANY, NELSON (DIVISION OF FRUITGROWERS CHEMICAL CO. LTD.)

in the upper parts of the trees could be picked; this eliminated much of the tiresome and slow ladder work associated with picking fruit from tall trees.

Glucina Bros. intend to use the trailer and platforms when pruning in winter and hope to eliminate the use of ladders and so reduce the time taken on pruning.

Trailers which have been filled with cases labelled before harvesting are linked together and taken into the orchard by tractor before each day's picking begins. As cases are required by the pickers they are taken off the conveyers from the rear of the trailer and after filling are placed on the front of the conveyers. This automatically keeps the empty cases pushed toward the rear of the conveyers ready for the pickers.

Stooping and reaching for cases are practically eliminated and as cases are never in contact with the ground, they are always clean and breakages do not occur through rough handling.

As there are three lines of cases on each trailer tier, up to six pickers can work efficiently and without confusion from each trailer.

Improved Ventilation

With $3\frac{1}{2}$ in. of clearance above the tops of the cases on each tier the cases do not have to be levelled off after filling and bruising is avoided and time saved. Ventilation between tiers is adequate.

Harvested fruit is well ventilated and shaded in the trailers. Flesh temperatures of 71 degrees F of peaches being harvested at 10 a.m. on a hot, sunny day fell to 66 degrees after the fruit had been in the trailer for 30 minutes. Peaches harvested at 7 a.m. and left exposed to the sun had a flesh temperature of 72 degrees at 10 a.m. whereas fruit harvested at the same time and put in the trailer had reached only 65 degrees by 10 a.m.

Handling in the Packing Shed

Full trailers are backed into the packing shed and unhitched. The cases of fruit can be taken off by the packers as required and the fruit sized and graded by hand and packed into the cases which have already been labelled before being filled in the orchard.

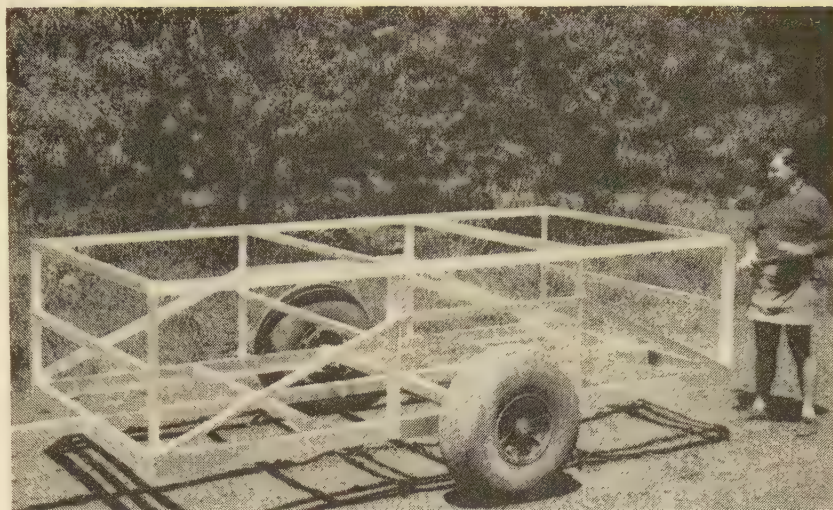
As each row of full cases is taken from the trailer empty ones are loaded on to the conveyers so that as soon as all full cases are off and packed the trailer is already loaded with empties and ready to return to the pickers.

The conveyer used in the packing shed is of the same construction as used in the trailer units but with only two sets of parallel rollers.

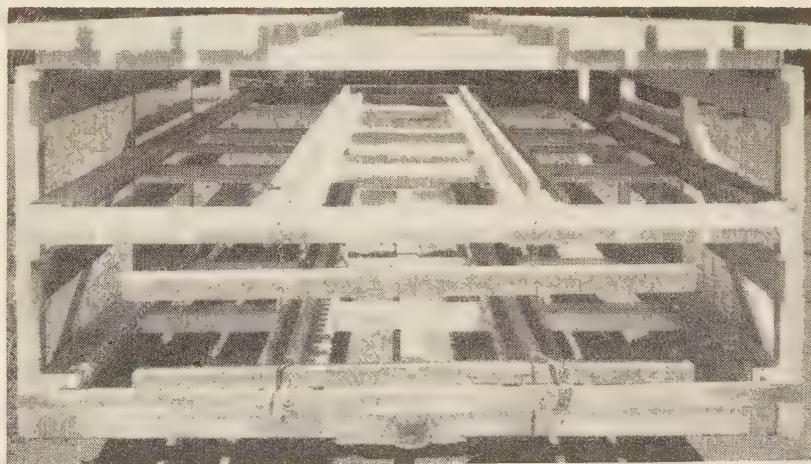
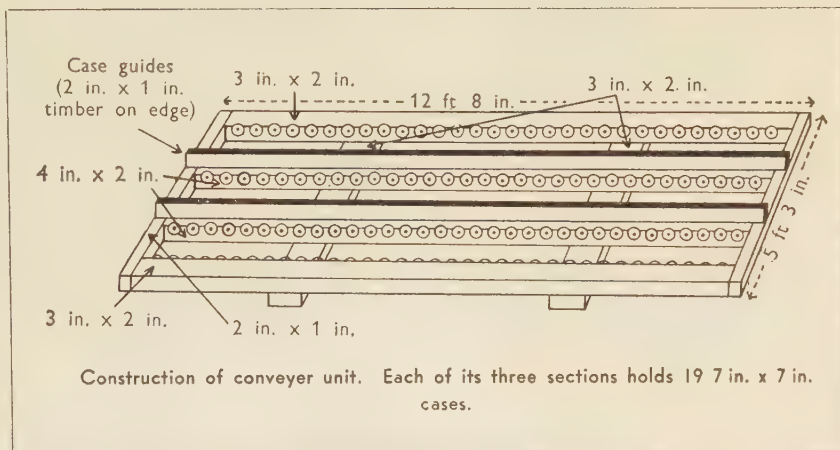
Trailer Specifications

Construction of the trailers is simple and they can be made for two or three tiers of conveyer units as desired.

TRAILERS AND CONVEYER UNITS



Two-tier trailer.



Two-tier trailer loaded with conveyer units viewed from the rear and showing stop bars and case guides.



Everything's under control . . .

What a fine figure of a scarecrow he is! Although bird traffic seems somewhat slack at the moment, who can doubt that those vast white gloves are capable of dealing with any emergency. Unfortunately, his command of the situation does not extend to the other pests of growing crops—the insects, the fungus spores and the weeds. To keep *them* under control the best weapons are agricultural chemicals from Shell.

Shell agricultural products include a comprehensive range of insecticides, fungicides and weed killers. Shell scientists are always

seeking better materials and methods . . . last season Britain's first liquid seed dressings came on the market—introduced by Shell. To the farmer of New Zealand, Shell offer first-class materials, ready availability and free technical service. If you have a problem involving the use of agricultural chemicals, Shell may well be able to help you. To find out is easy. Write to the Manager, Agricultural Chemicals Division, Shell Oil New Zealand Limited, P.O. Box 2091, Wellington.

YOU CAN BE SURE OF SHELL AGRICULTURAL CHEMICALS



2-tier Trailer

	ft in.
Overall length (excluding drawbar)	11 8
Overall height from ground	4 2
Width inside	5 3
Clearance between ground and chassis	1 1½

With the exception of height, which is increased to 5 ft 3 in. overall from the ground for the 3-tier trailer, both types of trailers are identical. Two-tier trailers may therefore be converted to three tiers if required.

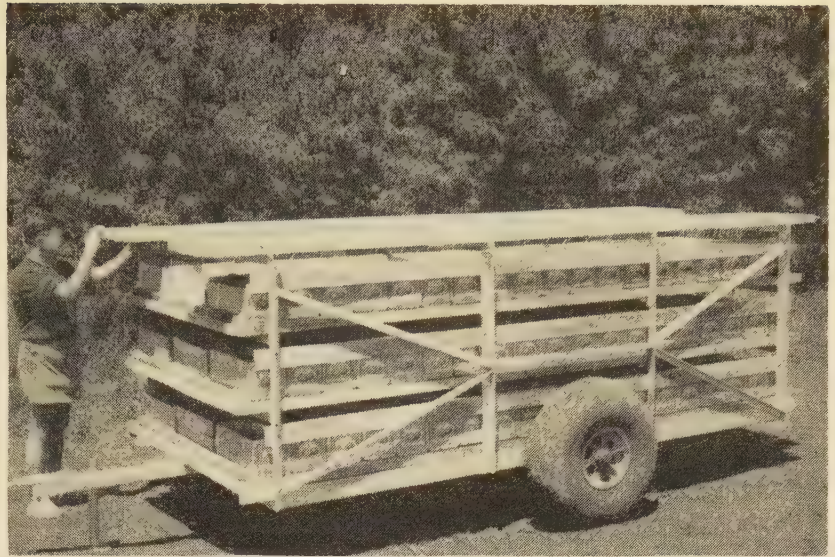
Construction of Trailers

Trailer chassis are made from 4 in. x 2 in. x ½ in. pressed channel steel and mounted on aeroplane wheels which have 11 x 12 balloon tyres. These low-pressure, balloon tyres obviate the need for springs on the chassis. Such wide tyres do not bog down easily in wet soil or pack the soil down into ruts. The wheels are mounted 6 ft from the front of the trailer and 5 ft 6 in. from the rear. The framework attached to the chassis is of 2 in. angle iron with welded joints.

An adjustable steel leg attachment similar to that used on caravans is welded to the drawbar and keeps the trailer level when disconnected from the tractor. A short coupling is welded to the rear of each chassis so that several trailers may be towed at once.

Dressed 3 in. x 1 in. timber attached to the inside of the side framework of the trailers acts as case guides, the distance between these and the 2 in. x 1 in. case guides on the conveyer units being 19½ in.

TRAILER AND CONVEYER UNITS



Three-tier trailer loaded with empty cases.

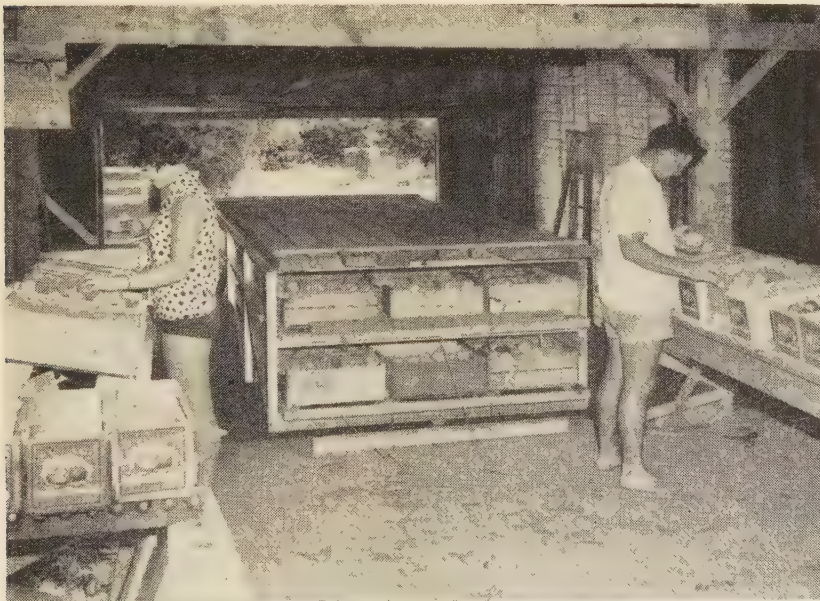
Costs for 3-tier Trailer (Including conveyers)

	£
Two aeroplane wheels with tyres and stub axles	20
Angle iron, steel, and welding (approx.)	35
Nails	5
Rollers	5
Timber and sundries	10
	75
	—

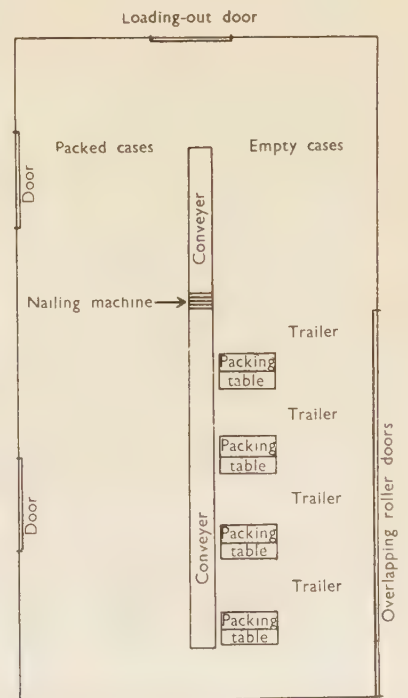
Labour costs are not included in the above. Two-tier trailers would be slightly cheaper.

Construction of Conveyer Units

Three roller conveyer units are built on each tier. The base of these units is constructed from 4 in. x 2 in. and



Trailer as it is backed into the packing shed.



Packing shed layout.



Bacteriologist on the sheep farm

Into every tube of Vetspen Hypodermic penicillin injection, kept ready-to-hand by wise sheep-farmers during lambing, goes all the skill and painstaking care of this young bacteriologist. As one of the large team of Glaxo scientists, her particular work is to help maintain ceaseless vigilance against bacterial contamination. She assists in the company's never-ending search for new substances to eradicate disease-causing bacteria. Her work ensures that each tube of Vetspen Hypodermic is fully potent and ready to help the sheep-farmer combat diseases, such as blood poisoning, that can cause heavy losses at lambing time.

Vetspen Hypodermic

AVAILABLE IN 3 STRENGTHS

- "100" 100,000 units penicillin per tube
- "500" 500,000 units penicillin per tube
- "1,500" 1,500,000 units penicillin per tube

*From Veterinary Surgeons, Chemists
and Stock & Station Agents.*

Glaxo and the World of Science

Glaxo, founded nearly 100 years ago in the Manawatu, is now a world-wide organisation famous for such contributions to medical and veterinary science as penicillin, poliomyelitis vaccine, streptomycin, vitamin B12, griseofulvin, cortisone and Complian (the complete food).



VETSPEN

the name for **GLAXO PENICILLIN**

GLAXO LABORATORIES (N.Z.) LTD.  PALMERSTON NORTH

3 in. x 2 in. timber and rollers are nailed with 2½ in. galvanised spring-head nails to the four longitudinal members of the base. At first, standard 2 in. rollers were tried, but they proved unsatisfactory for 7 in. x 7 in. cases, which were quite unstable when pushed along the conveyer. Smaller rollers (1½ in. diameter) at 2 in. spacings along the frame are now used and provide the necessary stability.

Rollers

The rollers were made by cutting 1½ in. diameter dowelling (boron-treated tawa) into sections 8 in. wide and drilling sufficiently large holes in their centres to allow the rollers to turn freely on the 2½ in. galvanised spring-head nails which serve as axles and attach the rollers. To prevent the base timber from splitting holes should be drilled for the spring-head nails 7/16 in. down from the top of the base boards and at 2 in. centres.

The conveyer units have an overhang of 7 in. at each end of the trailers, which allows for extra cases to be carried on each set of rollers.

Each section of conveyer was saturated overnight in diesel oil, which assists in making the rollers run freely and also stops water absorption in showery weather.

Locking Bars

Locking bars are necessary at the front and rear of the conveyer units to prevent cases moving during transport. Various types were tried during the season and a hinged type was considered most satisfactory. Four butt hinges should be used to prevent the bar from becoming warped. The locking bar is folded back to allow easy access and handling of cases during harvesting and packing.

Braces

The positioning of the 3 in. x 2 in. cross braces on the underside of the conveyer units is important, as they also act as locks to prevent backward and forward movement of the unit.

Steel crossbars provide support for each tier of the trailers and the cross braces of the conveyer units should fit neatly inside these bars.

Acknowledgment

The writer is indebted to Glucina Bros. for information supplied and permission to publish it.

All photographs by Sparrow.



Freedom - from - Hunger Campaign

TO combat the ravages of the "hungry season" which occurs for many farmers and rural people in underdeveloped countries in the months close to the new harvest, FAO, through the Freedom-from-Hunger campaign, is investigating ways to provide effective storage of the main foodstuffs, particularly cereals.

The trouble occurs mainly in drier areas where the growing season is so short that the staple millets and sorghums have to be stored a very long time from harvest to harvest. Damage from pests and other spoilage amounts to up to 30 per cent of the stored crop.

Illustrated is paddy being weighed and tested for temperature during an FAO investigation of grain storage in Burma. Through FAO a United Kingdom expert on grain storage visited Burma to supervise erection of storage facilities adapted to local conditions.

The project involves other factors beside storage. For example, farmers are being encouraged through extension work to use better seed of both earlier and later maturing varieties of crops to lengthen the growing season so that there is a shorter time between harvests.



Care of Livestock during August

By Wallaceville and Ruakura Animal Research Stations



MUCH time and effort can be saved over the busy lambing period by making preparations now. Just before lambing is expected to begin the ewe flock should be sorted up into three mobs; the early lambers, those with the most fully developed udders; the late lambing or dry ewes showing very little if any udder development; and the balance, which fall in between these two extremes. This preliminary sorting has many advantages. Early lambing ewes can be given the best feed available, while the late lambing group can be held tighter and if necessary made to clean up any rough feed. Shepherding can be concentrated on the lambing ewes; a quick look round the other mobs once a day is usually all that is necessary. At the end of lambing all the dry ewes are in one mob and the lambs in each paddock are of a comparable age for marking and vaccination.

Difficult birth is one of the commonest causes of lamb deaths. Excessively large lambs and those which enter the birth passage in an abnormal position are the ones which usually give trouble. Many of these could be saved by skilled and timely assistance. Such assistance requires:

PREVENTING LOSSES IN LAMBS

1. Ability to recognise the parts of a lamb by touch. It is helpful to be able to distinguish a front from a hind leg. The first two joints of a front leg bend in the same direction, but in the hind leg they bend in opposite directions.
2. A shepherding kit containing such essential items as a non-irritating antiseptic lubricant, a tin of penicillin, lambing cords, and bearing retainers.
3. Appreciation of the need for cleanliness and for being gentle when making manipulations inside the ewe.

During lambing it is possible to pick out those ewes which are unlikely to rear another lamb. These include bearing ewes and those with faulty udders or teats. Since such ewes cannot always be identified later, they should be permanently marked when first noticed. Coloured ear-tags are ideal for this. Ewes dry for the first time should also be marked so that they can be culled if dry again next season.

CULL EWES

It is little use rearing replacement stock unless there is a reasonable chance that they will at least maintain the existing production of the herd. In the selection of calves, therefore, full use must be made of production records of parents and relatives. Apart from this, calves born early in the season are easier to rear, particularly after weaning, than those born later. Ruakura records on many hundreds of animals show that calves born up until the end of August can be safely kept. Calves with any obvious deformity, particularly with weak and under-shot jaws, should not be kept, since many such defects tend to be inherited.

SELECTION OF CALVES

Grass staggers is more prevalent in animals grazing improved pastures on highly fertile country. It can cause serious losses on individual farms in some seasons.

GRASS STAGGERS IN RUN COWS

Recently calved cows within a month of calving are commonly found dead without any previous symptoms. Occasionally an affected animal appears nervous and if driven or unduly disturbed, frequently throws a fit or violent convulsion from which it seldom recovers. The disease is invariably associated with a fall in blood magnesium. Recent overseas work has shown that supplementing the diet with magnesium compounds gives effective control. Farmers experiencing trouble from this disease should discuss this problem with their veterinary surgeon.

If calves are being lost from redwater (leptospirosis), a veterinary surgeon should be called to treat affected animals and to advise on prevention of further losses by the use of protective serum or vaccination.

REDWATER IN CALVES

Milk from each quarter should be examined with a strip cup before milking. If it shows any abnormality, or if the udder appears inflamed, treatment with penicillin should be begun at once. Three tubes of 25,000 units should be injected at 24-hour intervals, even if the milk appears normal after the first tube. Prompt treatment early in lactation will often save a quarter which otherwise might become weak or even blind.

MASTITIS

If difficulty was experienced in getting cows in calf last summer, now is the time to seek veterinary advice with a view to preventing similar trouble this year. Facilities for diagnosing infectious infertility are available at Wallaceville, Ruakura, and Taieri. Specimens must be submitted through veterinarians or Livestock Instructors. Effective control depends on accurate diagnosis.

STERILITY IN COWS

Seasonal Notes

By Farm Advisory Division

MOB GRAZING AT LAMBING TIME

THE natural sequence to a mob-grazing system on sheep country is the shedding-off system of lambing, which is being practised on even quite difficult country on several properties in the Wairoa district.

August and September, just when the ewes' needs are at a maximum, can be critical months for feed on North Island sheep farms. Paddocks saved from autumn or spelled over winter should be rationed to the ewes, a start being made a month before lambing; then as lambing starts the mob should be moved every few days until at the height of lambing daily moves are made. Newly lambing ewes or those about to lamb will generally refuse to move and are left behind. In the early stages the ewes and lambs from neighbouring paddocks can be gathered together until each paddock has its quota of set-stocked sheep.

Advantages are not only nutritional; the system makes for easier shepherding, since the daily lamb beat over the whole property is avoided. Troubles, too, can be readily picked up, because the whole flock can be looked over during shifting. Docking becomes easier with small mobs of lambs of the same age to be handled.

Some difficulty can be experienced during storms, and quiet dogs are essential, but the system is flexible enough to be adapted to a wide range of country.

—E. C. AYSON, Wairoa

* * *

BARLEY GRASS CONTROL

BARLEY grass is an annual growing in high-fertility areas in both islands, and where the sward is open it is undoubtedly increasing in prevalence as the fertility is raised. The weed can be controlled and where conditions are suitable can be very nearly eliminated in one season. Very little barley grass seed remains viable in the ground for more than one season and if reseeding can be prevented in any one year, few if any plants will appear the next year.

Control can be obtained by spraying with TCA at 10 to 15 lb per acre in May or early June, but a more effective method is to spray with dalapon at 2 lb in September-October followed by a 1 lb rate in late October. The rate of application should not exceed 2 to 4 lb of dalapon per acre; otherwise damage could result to the better pasture grasses. Complete control of barley grass involves meticulous care in spraying, the job being done when the pastures are close grazed and before the barley grass comes into flower.

A boom spray may be used to treat extensive areas, but a hand-pressure gun should be used on isolated patches or along fencelines and under trees. Infestations under or near trees and shelter belts can be controlled by establishing prairie grass and grazing it selectively. On ploughable country where infestations are heavy and the pastures are run out it is best to plough the area, grow a summer crop, and sow back to pasture in autumn. Where this method is used the fencelines should be sprayed to prevent reinfestation of the pasture.

—J. A. GRAHAM, Palmerston North

* * *

CONTROL OF GRASSY WEEDS IN LUCERNE

ONE of the most serious threats to the life of a lucerne stand is the invasion of grass weeds. Of these the most important are browntop, Yorkshire fog, *Poa annua*, and barley grass. Three main methods of control are used—grazing, grubbing, and spraying—but none is entirely satisfactory.

Grazing is done when the lucerne is dormant in June to July; it can then be used as a run-off and lucerne hay fed out on the area. Stocking should be heavy and even if only partial control is gained, there is a compensatory build-up in fertility.

Grubbing as a means of eradicating grass weeds has had limited success. Three or four strokes with a grubber with narrow points in late summer when the grasses are still growing and the weather is suitable for a good kill may remove some grass weeds.

Spraying is the most effective method. It is annually done only if the grasses have become fairly widespread throughout the area. If the infestation is not too severe, an application of 4 to 5 lb of dalapon in early spring when the grasses begin to make growth will give reasonable control.

Farmers should be sure before spraying that there is enough lucerne in the stand to warrant the expense. It should be realised, too, that there can be a reduction in yield until after the first cut of hay.

—J. D. EADEN, Ashburton

* * *

NITROGEN FOR NEW GRASS

If a new pasture is sown on a carefully prepared seedbed at the right time with sufficient mineral fertilisers such as superphosphate, potash, and lime, grass and clover establish well and there is no need to worry about enhancing the establishment by the use of nitrogen. If, however, the establishment is not good, the use of nitrogen can be considered, provided any lack of mineral fertilisers and lime is made good.

Trials in the Auckland Province have indicated that though the use of nitrogen on young pasture may give a marked improvement for up to several months after application, it ultimately results in sward deterioration even where the new grass receives 3 or 4 cwt per acre of superphosphate. They also indicated that the greater the amount of nitrogen used the greater was the deterioration in the sward.

Nitrogen on new pasture should therefore be used with caution and only where the sward has been extremely well topdressed with mineral fertilisers and lime. In such cases the setback due to lack of nitrogen is generally only short and the pasture recovers as soon as the clovers establish. If the area has not been extremely well topdressed, money is generally much better spent in applying the superphosphate, lime, and potash required than in applying nitrogen.

—J. E. BELL, Auckland

—♦♦—

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New Methods in Cutting and Harvesting Machinery

By J. L. DOUTRE,

Machinery Instructor, Department of Agriculture, Auckland

CUTTING and harvesting of crops have always been among the hardest farm jobs. All the mechanical cutting principles used in agriculture today had their earlier beginnings several centuries ago and have been modified, strengthened, and highly developed to do particular jobs.

PROBABLY the greatest impulse toward cutting and reaping machinery began about 1805, when a rotary steel circular knife was devised to cut grain in England. This idea was improved on with the use of a series of revolving knives designed in 1811. During the 1820s and 1830s there were a number of inventions affecting harvesting. By 1850 both British and American reapers were being accepted and the day of the scythe was slowly coming to an end. The reciprocating knife, operating between fingers or guards and giving a scissor-like action, became the more standard system of cutting and was worked at slower speeds, was lighter, and was therefore easier to make. This single invention did more than any other to effect larger harvests by the single farmer and made possible the operation of vast holdings on America's and Canada's plains.

Reciprocating Blades

Mower knives have been modified for the cutting of all crops. The standard cutter bar will cut a wide range of plants from fairly short grass to heavy, tall cereals. Shorter, finer grass is best cut with a fine cutter bar having narrower and closer placed fingers. The larger stemmed crops such as chow moellier and scrub bush are best cut by a heavy cutter bar fitted with widely spaced and more robust fingers and a stout knife with pointed sections to give a sharper cutting action. Sometimes this is called a scrub bar. These various bar types are usually quickly interchangeable. Serrated ledger plates to hold the plant were replaceable by new ones when they became blunt or had broken edges.

Changes with Advent of Tractor

With the advent of the farm tractor in the 1920s and 1930s and its replacement of the horse, more speed and power and increased mechanisation

came to the farm. More rugged cutter bars had to be designed to cope with higher speed. Some high-speed mowers were designed without ledger plates, but allowance had to be made for sharpening the finger edges.

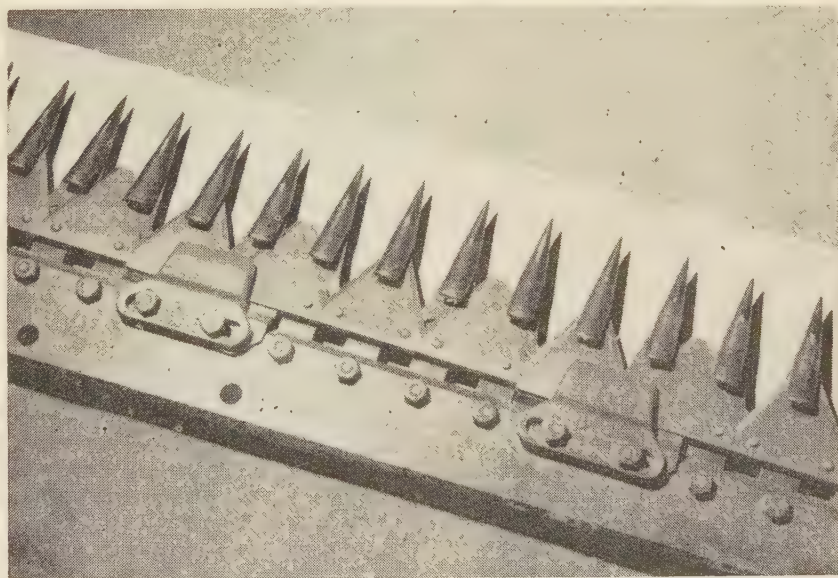
With the horse-drawn mower work would slow up when the knife became blunt or when any other defect created a greater power load. On the tractor an extra notch on the throttle was often resorted to instead of stopping to sharpen or adjust the knife. Consequently breakages increased and the machinery firms began investigating other cutting principles less prone to breakage, requiring less attention, yet capable of even greater speeds.

Rotary Blades

The fine grasses on sports grounds, lawns, and recreational areas demand a finer cutting knife. The reel-type mower designed for this work, was light in drive and could be pushed by hand or driven by a small electric or petrol motor.

With the introduction of speed and power in the form of these small motors attention was directed to rotary mowers, whose knives require very little attention. The chopping and shredding action of the rotary knives usually reduced the grass to small particles, which did not have to be removed.

Larger rotary mowers were later made to be driven by tractors. Their scope spread to the topping of field crops and cutting pastures for hay and silage. Safety precautions had to be taken to protect the operator from flying stones and exposed power take-off shafts. Large, rugged, rotary slashers with swinging flails or chains were devised to crush, lacerate, and uproot



Sickle bar mower knife. The reciprocating knife moves between adjacent guards, giving a scissor-like action as the sharpened edge of each section slices past the ledger plates or sharpened edges on each guard. The cutting efficiency depends on true alignment, sharp cutting edges, and good lubrication.

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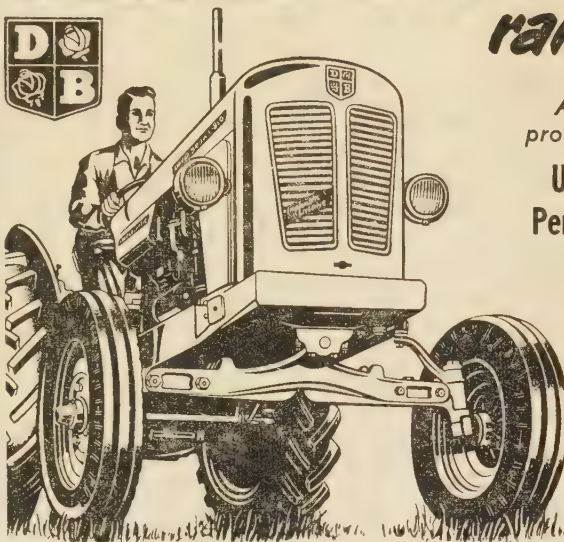
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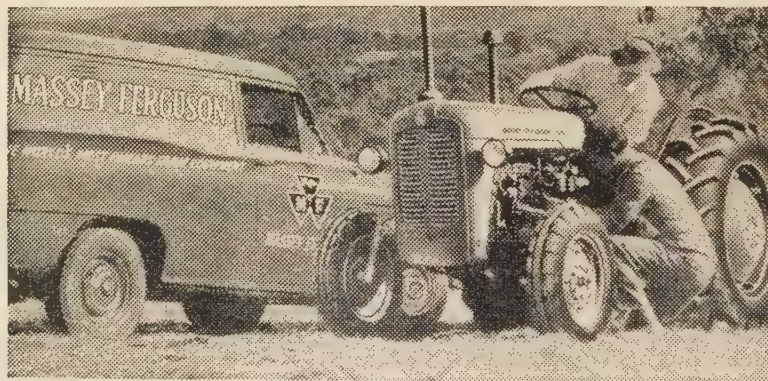
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scrub and other undesirable plants. On such large machines more protection must be given to prevent the operator being injured by flying sticks or rocks.

Development of Flail-type Forage Harvester

The rotary type of cutter chopped the plants so finely that the cut material could not be gathered easily until another modification had been introduced. The knives were fitted to a drum and were rotated in the opposite direction to forward travel. The cut material was flung forward and upward by the flail to pass over the drum and thence out behind.

So was developed the modern flail-type forage harvester. Most types have a fan type of blade and, like a centrifugal fan, create draught beneath the machine and blow the material up the chute. Some of these are now fitted with separate blower fans to elevate the cut material to a following trailer. The combination of cutting, elevating, and loading cut material into one operation eliminates the need for other grass-handling machinery.

Safety precautions with such a machine are not so necessary to protect the operator, but no one should be allowed to stand behind it when it is in operation, because rocks or stones thrown through the chute are a serious hazard.

For the cutting of hay crops, the heading of cereals, and the laying of

forage in the field to dry the sickle bar mower is still most widely used. Flail-type forage harvesters are beginning to do this work because of their lower maintenance costs and the elimination of the time-consuming job of sharpening mower knives. For the removal of fine grasses and close, even

cutting reel-type mowers are still preferred for golf and bowling greens.

For the eradication of top cover such as grass on fairways, football fields, or lawns or for the topping of a paddock the various sizes of rotary mower are widely used and require little maintenance and setting-up time. For more rugged work the rotary slasher is best able to cope with tough regrowth and to pulverise gorse, manuka, or broom.

Versatility of Forage Harvester

The flail-type forage harvester is most versatile. It can be used as a mower to lay the grass on to the sward to dry and can pick it up again if necessary. It will cut, elevate, and load silage into a following trailer. It can be used to eradicate light regrowth and unwanted bush, thistles, or rushes. It is even being used as a vacuum cleaner to remove refuse and litter from playing fields after the crowd has gone.

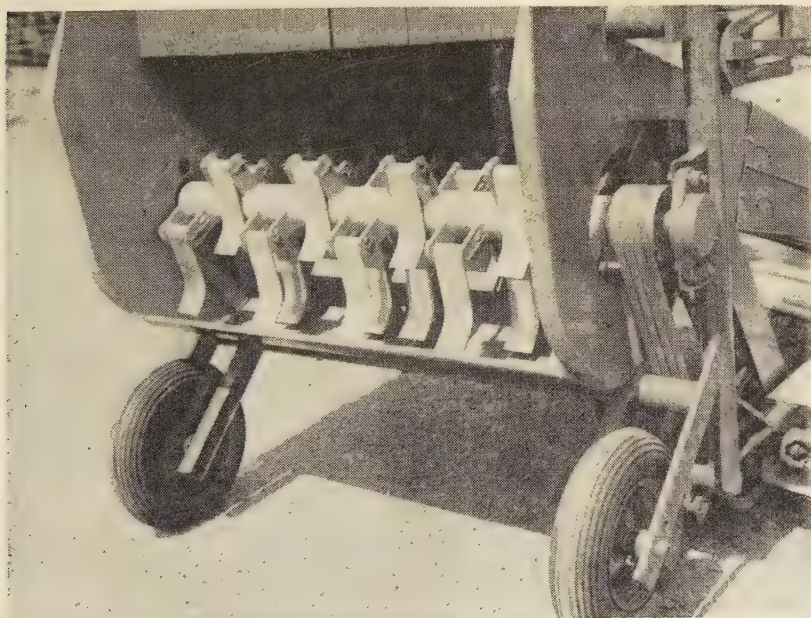
The power requirements of these machines will depend on the speed at which they are working and the amount of air pumped by their centrifugal fan action in elevating and loading. In some models special L or inverted T cutting knives are used since they require much less power. When a crop is being cut no dust is sucked up from the ground.

From the wide field of modern mechanisation it is possible to choose a machine most suited to the job at hand and fitting the power available to operate it.

CUTTING AND HARVESTING MACHINERY



Rotary slashers are of very rugged construction and capable of dealing with heavy brush or rushes. Since no fan action is created, running costs are reduced. A good clearance is necessary to allow dispersal of rubbish clear of the knives.



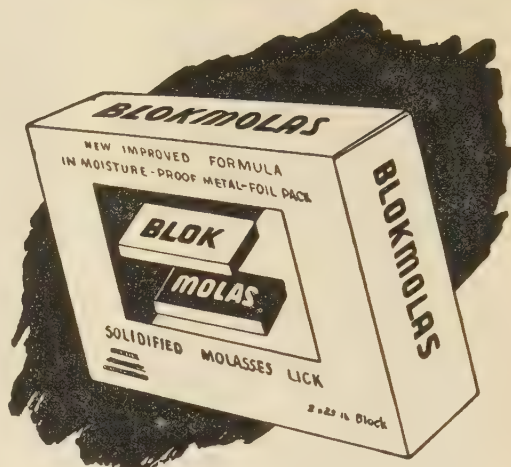
Base of a flail-type forage harvester. The pendant knives are designed to swing back when striking a solid obstruction, thereby reducing any likelihood of breakage. The material is cut and flung forward and upward, the fan action of the blades creating a blast of air to blow it into the following trailer or truck.

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Vegetable Growing for Home and Market Gardeners

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

Celery



Green celery ready to harvest;
note the plant habit and size.

CELERY is an important vegetable crop in New Zealand. It is grown to a limited extent by many vegetable growers, but a great deal is grown by specialists who grow only a limited number and area of other vegetables. For many years self-blanching varieties of celery mainly have been grown because buyers have preferred this type. However, unblanched green varieties of superior quality and flavour well suited to all the uses blanched celery is put to have been widely grown for a long time overseas. The excellence of good strains of green celery was pointed out in Department of Agriculture Bulletin No. 342 "The Home Vegetable Garden" when it was first published 10 years ago, and more recently trials at the Levin Horticultural Research Station (see March "Journal", page 224) have shown its value not only from a culinary point of view but because of its good growing qualities and resistance to disease. Increasing quantities of green celery have been sold in the North Island lately and, as it is proving extremely popular, there seems no doubt that eventually it will replace blanched and self-blanching kinds.

CELERY (*Apium graveolens*), a biennial that belongs to the same family as parsley, carrot, and parsnip, is chiefly valued for its distinctive flavour for salads, soups, or stews or as a relish with cheese. Its nutritive value is not very high and the blanched forms are relatively low in vitamins.

Celery has a very limited root system, which makes it a poor forager, and it needs a rich, well drained soil that is liberally supplied with moisture. It grows best in rich soils well supplied with organic matter and in cool conditions, except in the seedling stage, when cool or cold conditions force it into premature seed stalk

development. It is more tolerant of heat than lettuce though less tolerant of heat than onions.

The qualities desired in celery are large, thick-fleshed leaf stalks, vigorous growth, a full heart made up of many leaf stalks, pleasant nutty, characteristic celery flavour, tender, stringless, succulent growth, and, for blanching varieties, ease of blanching. Ease of blanching is, however, a varietal characteristic.

Quality, apart from heredity, depends on temperature, adequate soil moisture, availability and quality of plant food, rate of growth, freedom from disease, and other factors. Lack of crispness may be due to too high temperature, too much or too little moisture, nitrogen deficiency, or too slow or too fast growth. In blanched varieties flavour may be influenced by the lack of chlorophyll in the leaves.

Varieties

There are two distinct types of celery: The yellow or summer celery

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of which Golden Self-blanching is typical and green celery; there are many strains of both. Most of the older green varieties of celery are much more difficult to blanch than the self-blanching varieties, but blanching is not necessary with the many fine green varieties now available, as they are considered by those with experience of different types of celery to be superior to self-blanching types for salad and other culinary uses. Green celery for uses similar to those for which blanched celery is used has been grown and used widely in U.S.A. and Canada for at least 20 years and for a shorter time in Australia and has steadily increased in popularity.

New Zealanders, however, have been slow in recognising the superior qualities of green celery. Below are brief descriptions of most varieties of celery grown in New Zealand:

Green Types

The following green varieties were under trial last year at the Horticultural Research Station, Levin, and the comments on them were supplied by A. B. Webster, Research Officer, who was in charge of the trial:

Slowbolting Green 13B is a rather dwarf, stout plant with the stalks not tightly packed together. It is a heavy cropper which is not susceptible to bolting or to heart rot and it benefits from the use of gibberellic acid (which lengthens stalks), but it does not make a neat market pack, as the stalks spread out too much.

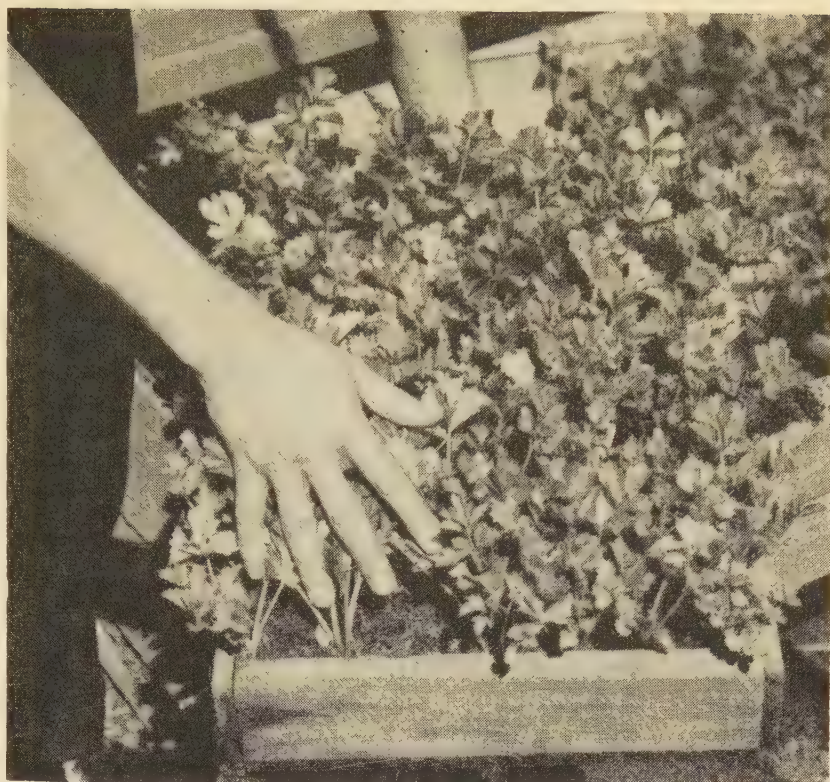
Slowbolting Green 12 is similar to Slowbolting Green 13B, but the plants are taller and have fewer sideshoots and the stalks are more closely packed. It is a heavy cropper not susceptible to bolting or heart rot. It is of good texture and was one of the best varieties in the trial.

Summer Pascal—Waltham strain is a rather dwarf, stout plant not susceptible to bolting or to heart rot. The leaves are slightly chlorotic round the edges and the leaf stalks are thick and fairly well packed round the stem. The texture is fairly good.

Pascal 259-19 is a rather dwarf, fairly stout plant which is slightly susceptible to bolting, but not susceptible to heart rot. The texture is good and stalks are fairly tightly packed. It is a moderate cropper.

Utah No. 15 is a heavy cropper with very tall, stout, round stems composed of fairly tightly packed pale green stalks. It is of good texture, but is slightly susceptible to rotting in the heart and to bolting. It is slow growing at the propagating stage.

Tall Utah 52-70 was the tallest variety in the trial. It gave the highest total yield, but it is rather susceptible to rotting in the heart and slightly susceptible to bolting. The pale green stalks are tightly packed round the stem and the leaves are very



[Green and Hobn

Plants of the desirable stocky type ready for setting out.

finely divided. Apart from its susceptibility to rotting it is a good variety of crisp texture.

Tall Utah 10B is tall with stout stems of good texture, but it is very susceptible to bolting and rotting. The outer edges of the leaves are chlorotic.

Earl'green is a shorter variety than those already mentioned that cropped heavily at Levin. It is susceptible to rotting in the heart, but seldom to bolting. Though its texture is fair, it was the poorest of the green varieties in the trial. The base of the stick is broad and stalks are not very tightly packed.

Self-blanching Types

Golden Plume has tall, stout, golden sticks. It is only slightly susceptible to heart rot and bolting and is a heavy cropper. The texture is rather poor, but it was the better of the two self-blanching types used for comparison in the Levin trial of green varieties.

Cornell No. 19, which is rather dwarf and slender, was by far the lowest yielder in the Levin trial. It is very susceptible to bolting and slightly susceptible to heart rot. The texture was good. It was slow in the propagating stage.

Golden Self-blanching is still the most widely grown market variety. It is also grown for processing and by many home gardeners. It is suitable for harvesting early or throughout the season. The best strains are non-bolting and have creamy white, solid, easily bleached stems with a fine nutty flavour.

Golden Supreme Self-blanching is a selection of Golden Self-blanching which is a little earlier, slightly taller, and popular in some districts for early harvest. It is attractive and carries well. It is also widely grown.

White Plume has white foliage tinted with green. Stalks and foliage blanch very readily to snowy white and are tender. It is a rather dwarf variety which requires less earthing up than the last two varieties mentioned.

Solid White (White Pascal) is probably one of the best of the older green-leaved, white-stemmed varieties for very late or winter use.

Solid Red has very large, compact, hardy heads. Though little grown, it has a very fine, nut-like, distinctive flavour. The outer leaf stalks and to some extent the margins of the inner stalks are red or pink. It is well suited to winter use, particularly in colder districts.



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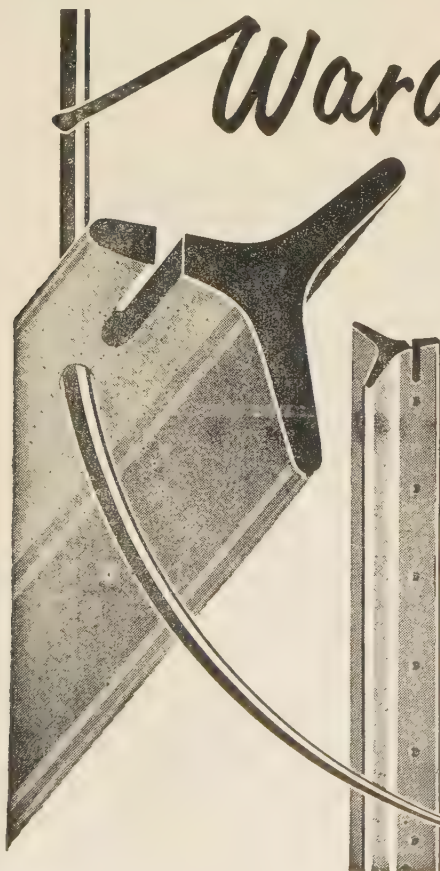
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Hole spacings :

1", 8", 7", 6",

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Sowing and Plant Raising

Celery seed is sown from September until January according to district and whether early or late or successional crops are grown, except in Auckland, where the season is much longer. In southern districts seed is sown from late October under glass until early December. Plants for early (and in some districts all) crops are raised in glasshouses, but particularly in the milder districts the main and later sowings are made in frames or in open nursery beds. Outdoor sowing is precarious in many districts because the plants go to seed if subjected to temperatures of 50 degrees F or lower for two weeks while they are seedlings, though later they are quite tolerant of low temperatures.

Celery seed is not easy to germinate unless conditions are very favourable. Early sowings are made in seed trays in glasshouses or in frames in specially prepared seed compost or prepared soil. For later sowings seed may be broadcast or sown in rows with a wheel seed sower in a frame or in the open.

The soil must be sterilised with heat or chemicals if pests or diseases are likely to be troublesome. Material such as formalin, chloropicrin, or

Celery planted in 5-row beds →
(five rows 10 in. apart with 6 ft
between centres of beds) six weeks
after planting.

(Plants in both these illustrations are
of the green variety Tall Utah 52-70.)

Celery planted in 2-row beds →
(rows 6 in. apart, plants staggered
12 in. apart in the rows, and 3 ft
between centres of beds).

methyl bromide may be used. Seed trays should also be sterilised and this can be done simply by dipping them in a 2 per cent formalin solution.

For seed sowing John Innes-type compost may be used or a mixture made of 2 parts of good disease-free loam, 1 part of well rotted manure, and 1 part of coarse sand, to which should be added 4 lb of carbonate of lime and 4 lb of superphosphate to every cubic yard of seed mixture.

The modified John Innes compost consists of 7 parts of good loam, 3 parts of peat or leaf mould, and 2 parts of coarse sand (all by volume), to each cubic yard of which should be added 1 lb of carbonate of lime and 5 lb of a mixture of 2 parts of blood and bone, 2 parts of basic superphosphate, and 1 part of sulphate of potash (all by weight).

In frames or in nursery beds seed is either broadcast thinly and lightly raked into the soil or sown in shallow drills 6 in. apart (made by pressing the edge of a plank $\frac{1}{4}$ in. into the ground) and covered lightly with fine soil or sown with a wheel planter.

SOWING AND PLANTING CELERY



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IN ALL WEATHERS**



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Thin sowing aids the production of stocky plants.

The soil must be kept moist. With frames the sashes should be raised on warm days or, if the weather is favourable, removed when the plants are about 3 in. high. In open or frame-covered beds $\frac{1}{2}$ oz of seed should be allowed to each 100 sq. ft. of surface and should produce about 6,000 to 7,000 plants. In boxes under glass 4 oz to the acre is usual where the plants are to be pricked out again into boxes before being set out in the field, though plants from nursery beds in frames, particularly for early crops, are also commonly pricked out 2 in. apart as soon as they are large enough to handle.

Where plants are widely set out (not more than 28,000 to the acre) 500 sq. ft. of bed surface is adequate and 4 to 6 oz of seed is enough for each acre. If 50,000 to 60,000 plants are needed for an acre, 800 sq. ft. or preferably 1,000 sq. ft. of plant bed is needed and 8 oz of seed should be allowed.

Seedlings usually appear in from five to 14 days according to temperature and the condition of the seed. Seedlings should be pricked out 2 in. apart each way. They must be kept moist until they are large enough to handle (usually about two to three weeks after emergence). During this time they should be given plenty of light, and unless conditions are very good a spray with copper oxychloride is usually good insurance against damping-off diseases. Some hand weeding may be necessary if the soil has not been sterilised with material effective against weed seed.

Soil and Lime

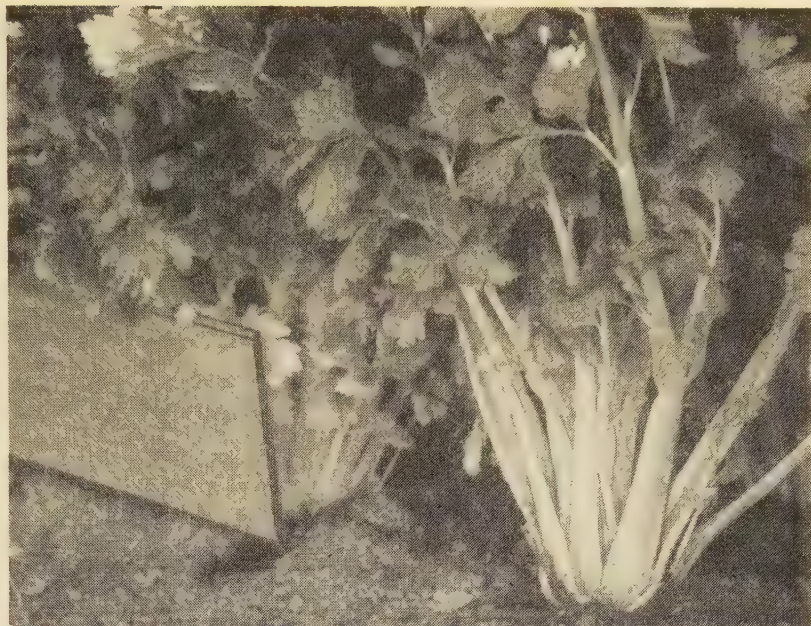
Because celery needs a good deal of water, soil that is rich in organic matter and so holds water well is desirable. Rotation with other crops is advisable and celery commonly follows lettuce, spring cabbage, cauliflower, or a green crop, but it is possible to grow celery in the same soil each season for many years if soil management and hygiene are good.

Celery seems to prefer a slightly acid soil, though the evidence is not conclusive. Excellent crops are grown in soils varying from pH 5.5 to pH 7. Moderate liming appears to be most satisfactory on most soils to prevent the soil from becoming too acid; too much lime may induce boron deficiency, which will cause stem cracking.

Manure

Many growers work in up to 10 tons to the acre of well rotted farmyard or poultry manure in addition to fertilisers such as blood and bone, superphosphate, and sulphate of potash. Where animal manure is not available a heavy green crop or the residues of other crops may be ploughed in to supplement fertilisers, which are used

GROWING CELERY PLANTS



[Green and Hahn]

Board removed to show blanched stems of self-blanching celery.

by some specialised growers at up to 8 tons to the acre. However, fertiliser is usually applied at less than half this rate—commonly a little over a ton to the acre in the base dressing and several hundredweight in side dressings. Generally most of the fertiliser is applied as a base dressing, but a few growers plant in rich soil and confine fertiliser applications to side dressings, which may be of dried blood at up to 2 tons per acre or blood and bone at even heavier rates. Complete fertilisers made up for general use are used by some growers.

Celery crops are usually given two side dressings, one after the crop has become well established and the other usually three to four weeks before harvest, but side dressings may be given at any time the grower considers them necessary.

Growers apply boron where it is known to be deficient in the base dressing in the form of borax at 15 to 20 lb to the acre.

Planting out

Four to six weeks after pricking out, plants have made enough root to enable them when lifted or cut in squares out of the trays to hold the attached soil. Whether in trays or nursery rows the plants should first be watered. If they are carefully planted into a good, rich, moist soil and not allowed to dry out or be subjected to low temperature while they are small (always a possibility in early plantings), they suffer little check and mature quickly.

Stocky plants about $2\frac{1}{2}$ to $3\frac{1}{2}$ in. high are most desirable for hand setting in the field, though plants up to 6 in. high are commonly set out. Dull weather is preferred for setting out. Rows should be kept straight with string or wire. Often a wooden marker made like a large rake with wooden prongs set at the pre-determined distances apart is used.

Cutting the taproot is a fairly general practice, the object being to encourage the plant to form a mass of strong fibrous feeding roots, which facilitates transplanting.

Where the row method of planting the seed is used root trimming may be done, preferably 10 to 14 days before planting out, by forcing a long-bladed knife or sharp spade under the rows of plants at a depth of about 2 in. Plants should be watered immediately after roots are trimmed to encourage them to form fibrous roots and to prevent wilting.

Where growth has been uneven, as sometimes happens with plants grown in beds, plants should be graded to size. Only the best should be planted and this may mean the rejection of a great many plants, particularly where the sowing rate has been high. Some trimming of foliage may be done to reduce loss through transpiration and to facilitate handling if the foliage is considered too large in relation to the roots.

Plants are usually set out with a trowel from $1\frac{1}{2}$ to 3 in. (depending on plant size) below the original soil level.

**FOR USE AFTER ASSISTED
LAMBING TO PREVENT
BLOOD-POISONING AND
BLACKLEG IN SHEEP.
FOR FOOTROT IN DAIRY
COWS, CATTLE AND PIGS.
FOR ARTHRITIS IN LAMBS
AND PIGS.**

PROCAL

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hypodermic penicillin

For intramuscular injection!

Three Strengths

'100' (Lambs) Arthritis, etc.

'500' (Ewes) At Lambing, etc.

'1500' (Cattle & Pigs) Footrot, etc.

In flat tins with hypodermic needle

MANNINGS HAMILTON
VETERINARY LABORATORIES



**THE GREAT EWE SAVER
AT LAMBING TIME —
PROCAL**
(pronounced Pro-kal)

Blackleg in sheep, more commonly referred to as blood poisoning, usually results from infection of wounds, such as occur at shearing, dipping, lamb marking, docking or in ewes while lambing. This is understandable when it is realised that the blackleg germs are frequently found in the wool and on the skin of normal sheep and in the soil and pastures.

**Prevent Ewe Losses at
Lambing Time**

Blackleg losses in ewes associated with lambing are prevalent during the lambing season, and ewes assisted at lambing almost invariably die unless an intramuscular injection of Procal (pronounced Pro-kal) Hypodermic Penicillin 500 is given immediately after each operation. A further injection after 24 hours—as a preventive measure—should follow. At lambing most cases are due to infection from shepherds' hands; an immediate injection of Procal will kill the bacteria before it can attack.

Navel Ill or Arthritis in Lambs

Navel Ill or Arthritis is a bacterial infection causing an inflammation of a joint and sometimes death. These bacteria enter the body either through the undried navel cord soon after birth or through wounds, such as occur at castration, docking and ear-marking. They then reach the joints via the bloodstream. Affected lambs are lame on one or more legs, or may show a general stiffness, a few days to a week or more after marking, and death may occur quite quickly.

**Treatment and Prevention
with Procal**

Navel Ill and Arthritis frequently causes death unless treated with Procal. A preventive injection of Procal immediately after each operation will attack the bacteria in the bloodstream. For small lambs, inject one tube of Procal 100; and repeat as necessary. In acute cases, a tube of the stronger strength—Procal 500—is advisable.

**Footrot in Cattle, Dairy
Cows and Pigs**

Many cases of footrot respond dramatically to Procal Penicillin. An injection of one or two tubes of '1500' strength with a repeat in 24 hours is recommended.

Procal is a laboratory proved formula of Procaine Penicillin and Crystal Penicillin. This combination provides the properties of the quick-acting crystal ingredient with the longer, more durable suspension of Procaine Penicillin.

BLANCHING AND HARVESTING CELERY

They are usually watered immediately with a hose or by overhead irrigation.

Land must be well supplied with organic matter, weed free, and well cultivated and drained. Fertiliser or manure is usually worked into the soil shortly before the plants are set out. Under the same growing conditions the bed method produces smaller plants than where plants are set out in single or double rows, as it restricts development.

Planting distances vary according to variety, district, and local grower preference. Plants may be set in single rows 18 in. apart with the plants 6 to 12 in. apart in the rows or in double rows 24 to 36 in. apart with the plants 9 to 12 in. apart each way. Beds, usually set 24 to 36 in. apart, are widely favoured and may be of four, five, six, or even 12 rows, with the plants usually staggered and set, according to size of the variety or to local preference, from 6 to 14 in. apart each way; most are set 10 to 14 in. each way. Fertiliser and manure are worked into the surface soil shortly before planting.

Cultivation and Weed Control

Celery set out in rows that are wide enough apart can be cultivated with power-driven machinery, but most celery is closely planted in beds and cultivation is restricted to hand hoeing and weeding. Chemical weed control with, for example, CDEC has been tried tentatively by some growers, but is not a general practice.

Irrigation

Celery responds well to irrigation, as it is shallow rooting and needs a moist, rich soil. Overhead sprinklers are widely used by commercial growers because of their convenience, but care is needed. Late in the season when the crop is nearly mature water must be kept out of the hearts or rots may develop.

In its natural habitat celery is a marsh plant, but cultivated varieties can be ruined by excess irrigation, particularly overhead. Cultivated celery will not grow satisfactorily on a wet as distinct from a damp soil or where the watertable is maintained near the surface.

Blanching

Most self-blanching celery is grown and blanched in beds, usually by placing planks round the outsides of the beds when the plants have nearly reached full growth, usually when they are about three weeks off maturity. The boards, usually 10 to 12 in. wide and about 1 in. thick, are first laid flat on the ground on the side of the row or bed to be blanched and the inside edges are forced against the plants and the boards raised, bringing with them all the outside leaves until the planks are on edge. The edges



[Green and Hahn

Blanched celery ready for harvesting. Plants are cut with a long-bladed knife or sharp spade or shovel just below the crowns.

are then forced into the ground or soil is thrown against them where necessary to shut out light. The boards are held in place with pegs.

Just before or just after the blanching material is put in place the plants are topdressed with a nitrogenous fertiliser, which is watered in immediately. Sulphate of ammonia, nitrate of soda, or dried blood at 1 to 1½ cwt per acre is preferred by most growers for forcing the plants into final growth and especially for stem and heart elongation. Some varieties blanch more readily than others, but self-blanching varieties can usually be blanched in from 14 to 21 days.

Harvesting

Most growers harvest their crops over a period, usually from beds that have been planted and blanched successively. When the plants are ready the blanching material, if any, is removed and the plants are cut with a long-bladed knife or sharp spade or shovel just below the crowns, leaving the roots in the ground. The bases are then trimmed and outer leaves that are damaged, of poor colour, too short, thin, and generally coarse and inferior are removed. More than half the leaves may be discarded.

The celery is then taken from the field, washed under pressure to remove soil and grit, graded according to size and quality, and bundled, put into boxes, cartons, or plastic bags, or simply packed in grades for market.

A plastic bag commonly holds one stem, a carton about 40 lb, a bushel box about 60 lb, and a banana case about 100 lb.

Yields

Yields vary according to variety, planting distance, and standard of culture. Particularly good crops closely planted in beds may yield about 40 tons to the acre; 30 tons to the acre is considered a very good yield. After allowing for heavy waste in some crops in harvesting and trimming, wider spacing, and lower standards of culture it is probable that an average would be nearer 15 tons to the acre. One estimate gives about 1,000 plants to the ton early in the season and later about 1,000 plants to ¾ ton.

Common Diseases and Pests

The following are diseases and pests which commonly attack celery:

Celery Leaf Spot

Celery leaf spot (*Septoria apii*) is widespread and is the only serious celery disease with which New Zealand growers have to contend. It spreads quickly through a crop, causing severe losses. Badly infected plants remain stunted and unthrifty and the market value of stalks is reduced.

Celery leaf spot attacks leaves, leaf stalks, and stems. The disease appears first on the outer leaves as numerous, small, irregular brown lesions about

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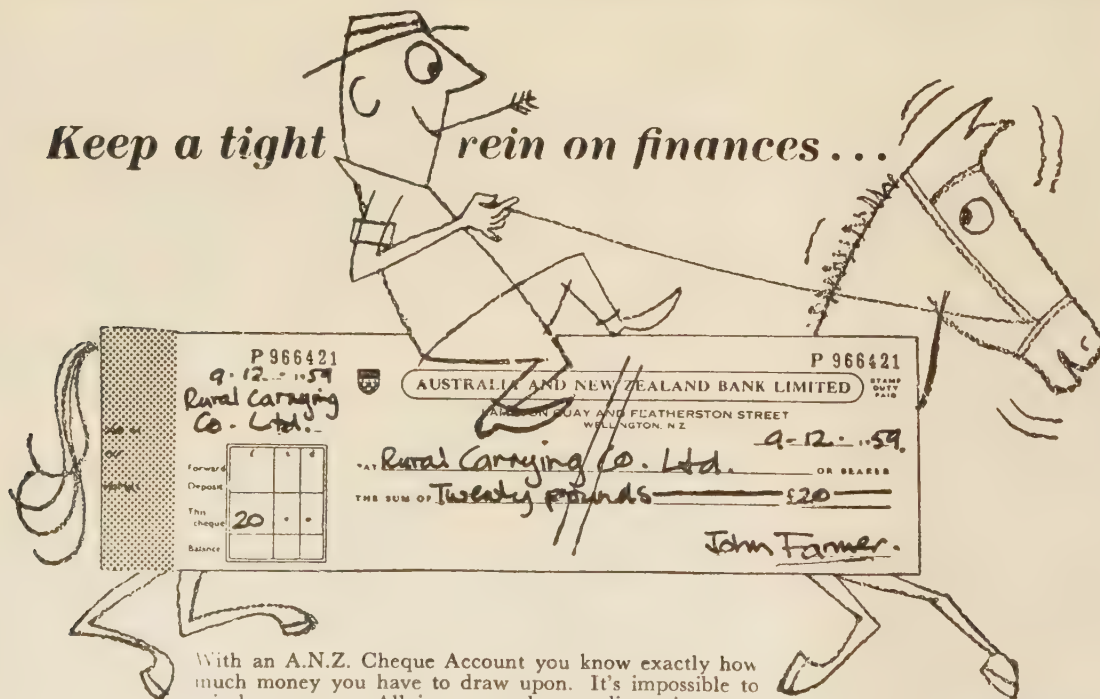
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Other Du Pont Weed Killers recommended:—"TELVAR" MONURON and "KAR-MEX" DIURON for crops and sterilization application; "AMMATE" X for weed and brush killing; "TRYSBEN" 200 for perennial noxious weed killing.

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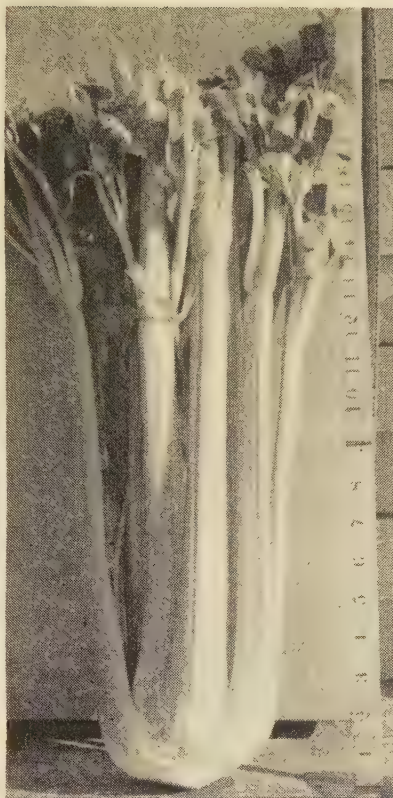
1/16 in. in diameter with a distinct margin. Infection spreads rapidly over foliage, the spots coalesce, and the leaves finally turn brown and die.

The disease can be recognised by the numerous black, minute fruiting bodies which protrude from the brown tissue on the lesions. On plants grown for seed the fungus becomes established on flower stems and on the outer coats of the seeds. Celery seed from an infected crop has occasional seed showing the minute, black fruiting bodies. They are most readily seen on the small stalks still attached to some of the seeds.

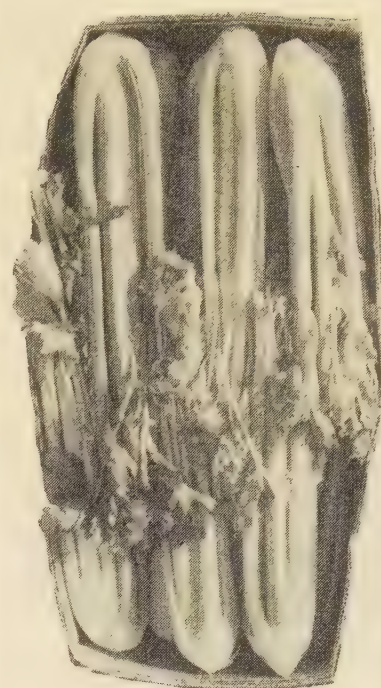
The disease is carried over on seed and also in the soil on decaying celery refuse from a previous crop. Spores are spread in the growing crop by rain, wind, insects, and man to healthy plants in the vicinity. Infection may also be carried to the field or seedling bed from a compost heap. Ample moisture and a temperature range of 60 to 70 degrees F provide conditions most favourable for infection.

Control: Infected seed can be disinfected by being dipped for 10 minutes in water held exactly at 136 degrees F. Soil for seedling boxes should be disinfected with steam, formalin, or chloropicrin or other approved material. Plants should be sprayed with bordeaux mixture 6:8:100, copper oxychloride (50 per cent) at 5 lb per 100 gallons of water, or zineb or maneb at 2 lb to 100 gallons of water. Zineb is widely used in many districts. Applications may have to be made weekly or fortnightly according to severity of infection, growth of the crop, and the frequency of rain or overhead irrigation, which washes sprays off.

PREPARING CELERY FOR MARKET



Medium stick of green celery ready for packing.



Small sticks of green celery washed, trimmed, and packed in non-returnable waxed cardboard cartons which take 12 heads and weigh about 33 lb.

Black Heart

The first symptoms are usually brown lesions on the outer margins of the youngest leaves in the centre.



Celery leaf spot, the only serious disease of celery with which New Zealand growers have to contend.

They may dry out brown or the browning may spread and become darker until the central parts are blackened. Secondary rots usually follow. Control measures include hygiene, rotation of crops, and balanced feeding and watering. The trouble is caused by extremes of dryness followed by wetness and is usually associated with heavy applications of nitrogen. Some varieties are more resistant than others.

Stem Cracking

Stem cracking of celery is usually due to a deficiency of boron, but it may also result from nutritional disturbance associated with too much nitrogen and rapid drying out. It can be controlled by balanced manuring and an even supply of moisture, or application of borax at up to 20 lb per acre. Boron deficiency can be accentuated by alkaline soil conditions (high pH).

Sclerotinia and other Soft-rot Organisms

The fungus disease *Sclerotinia sclerotiorum* occasionally attacks celery when the weather is very humid and the soil wet. Generally the first sign is a thick white mycelial mat appearing on the outer surface of plant tissue, after which small, hard, black sclerotia, usually about the size of a

Most effective for

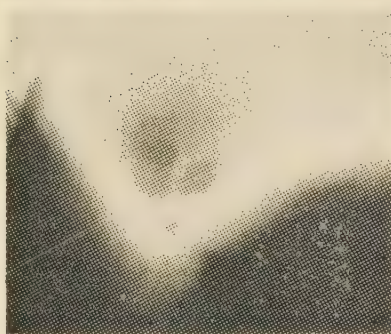
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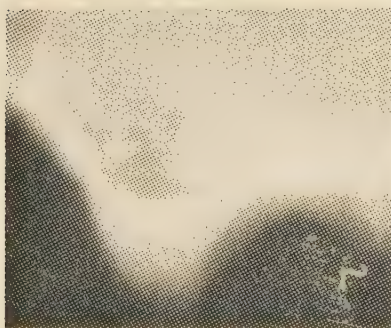
OINTMENT-TYPE TREATMENT

LIQUID TERRAMYCIN-TYPE FORMULA



**RIGHT
AFTER
TREATMENT**

Some ointment is still stuck in teat canal.



**1
HOUR
LATER**

Ointment balls up; antibiotic release delayed.



**4 HOURS
AFTER
TREATMENT**

Globs of goo are still present in the udder.



**RIGHT
AFTER
TREATMENT**

Liquid formula disperses fast after treating.



**1
HOUR
LATER**

There's no holding back this preparation.



**4 HOURS
AFTER
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There's a perfect mix throughout the quarter.

Only antibiotic particles clinging to the outside of the ointment globs are available to go into solution for fighting mastitis. Treatment is slowed down . . . and cows never have the benefit of full antibiotic release any time within a single milking period. Photos show that even up to 4 hours after treatment, ointment treatments are still in globs.

When liquid Terramycin is used, it mixes completely as milk is secreted and makes maximum contact throughout the milk-producing tissues. All of the Terramycin goes to work immediately . . . everywhere in the quarter where there is secreted milk. Then after it has done its work, it milks out completely within 72 hours. *

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**LIQUID
FORMULA
for
MASTITIS**

Terramycin

Available through your veterinarian
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pea, appear. Control consists of destroying infected rubbish as soon as it is seen and spacing the crop plants to give adequate ventilation.

Other organisms such as *Erwinia* spp. are also associated with the rotting of celery and are usually due to infection after mechanical injury. Control is as for sclerotinia.

Aphids

Aphids by sucking the sap distort the foliage and may also introduce virus diseases. They are readily controlled on celery by spraying with malathion 25 per cent wettable powder at 1 lb to 100 gallons of water or with lindane according to the manufacturer's recommendation.

Carrot Rust Fly

The larvae or maggots of the carrot rust fly are slender, creamy white, rather rigid, legless maggots up to about $\frac{1}{4}$ in. long, broad at one end and tapering to a slender head. The adult is a small, shining black fly about $\frac{1}{4}$ in. long with one pair of wings. The fly lays its eggs near the crown of the plant and the larvae or maggots, after hatching, burrow down and enter it under the ground.

Celery should not be grown near a carrot crop or near where infected carrot, parsnip, or parsley crops recently grew. Seed should be dressed with lindane 50 per cent wettable powder at 2 per cent of the weight of seed.

SOWING AND PLANTING

Mainly small sowings in favourable soils and situations:

Beetroot, broad beans, carrots, Chinese cabbage, cauliflower, summer cabbage, kohlrabi, lettuce, leeks, turnips, radishes, peas, salsify, scorzonera, spinach, silver beet, and parsley and many other herbs.

Plant out in well drained properly enriched soil:

Rhubarb, asparagus, horse radish, lettuces, silver beet, onions, cabbages, cauliflowers, kohlrabi, Jerusalem artichokes.

August Work in the Home Garden

By A. G. KENNELLY

GROUND and air temperatures may still be low in August, but conditions are getting brighter, the sun is stronger, and the days longer. Most keen home gardeners will have the urge to plant and sow, but while ground temperatures are low and heavy frost may still occur, sowing and planting should be limited and confined to hardy vegetables.

PARTICULARLY where the soil is heavy or moderately heavy, ground conditions are rarely consistently good throughout New Zealand in August. If there is a cold, wet spell after sowing, crops may fail. The importance of continuity of supply in the production of vegetables can hardly be overstressed and because in most gardens a break in supply is most likely soon after winter vegetables are exhausted and before the new season's supplies come in, seed sowing or the setting out of young plants should be started as soon as possible in the new season.

Testing Soil Condition for Sowing

The suitability of soil for sowing can be tested after it has been dug over. It is usually in the right moisture condition if it does not stick to the soles of the boots when it is walked on. If there is enough moisture, soil condition is less important for planting, but if the soil is inclined to be wet, it is better to work from a board laid on the ground than to walk on the surface when either sowing or planting.

Small sowings of most hardy vegetables can be made in well drained soils in favourably situated gardens where the ground has warmed enough. In a few districts frost-tender plants such as tomatoes, cucumbers, marrows, pumpkins, and melons can be sown under glass to be ready for setting out when frost danger is past. Though the time taken to produce good plants for planting out varies according to the

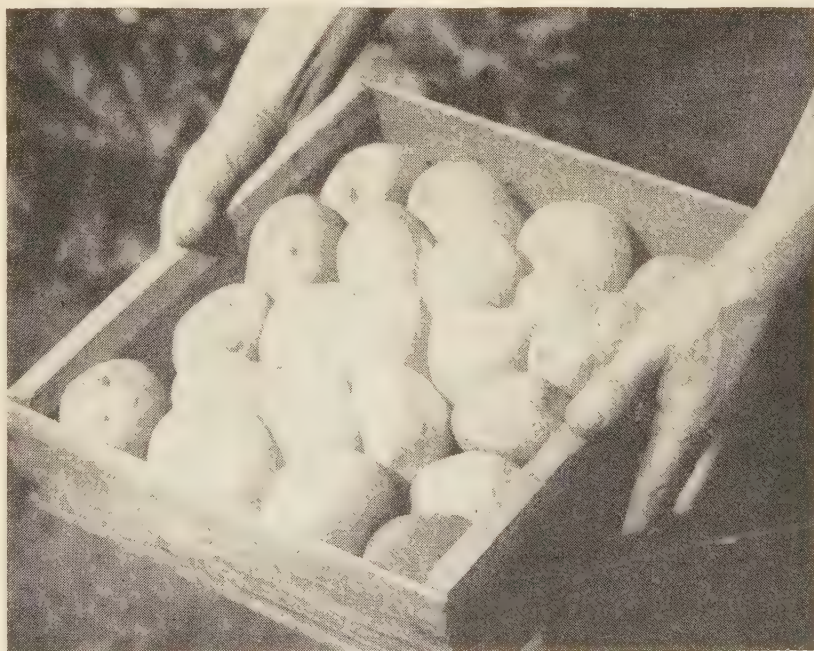
treatment given, tomatoes started in warm, favourable conditions usually take about six weeks and the other plants mentioned about half that time

to reach a suitable state for planting out.

Sowing should be governed by the facilities available and the extent of damaging frost. It is not advisable to have plants ready too early. The date to begin planting out varies from about mid October to late October in some northern districts and to the second week in November in some southern districts.

Asparagus

In most districts August is the preferred month for setting out a new



[Green and Hahn

Though August is much too early in most districts for the planting of main-crop potatoes, seed can be set to sprout in shallow boxes such as this.

Grain Silo and Feed Store for Poultry Farm

bed of asparagus, as usually ground conditions and the plants or crowns to be set out are in the most suitable condition then. One-year-old seedlings are usually preferred, as they transplant better and establish more readily than the two-year crowns, which are considerably larger and therefore more subject to damage during transplanting. Young plants can be set out with the top buds covered at first by not more than 2 in. of soil, as they are liable to be smothered and retarded if deeply covered before they become established and sufficiently strong.

Broad Beans

Broad beans can still be sown in districts where soil moisture is likely to be adequate up to the time of harvesting the crop.

Carrots

Seed of carrots can be sown as soon as soil conditions are favourable. In most home gardens several small successive sowings are preferable to one large one.

Carrots are high yielding and grow well in deep, rich, well drained, and well cultivated soils that contain adequate well rotted organic matter. Popular varieties include Red Cored Chantenay, Taranaki Strongtop, and Nantes. Oxheart is a good early variety.

Onions

In most northern districts or where it is customary to sow the main crop in autumn, onion plants can be set out 3 to 4 in. apart in rows 12 in. apart in August. In most northern districts the main crop is sown in September, but in favourably situated gardens where soil conditions are good a small early sowing may be made toward the end of August.

Peas

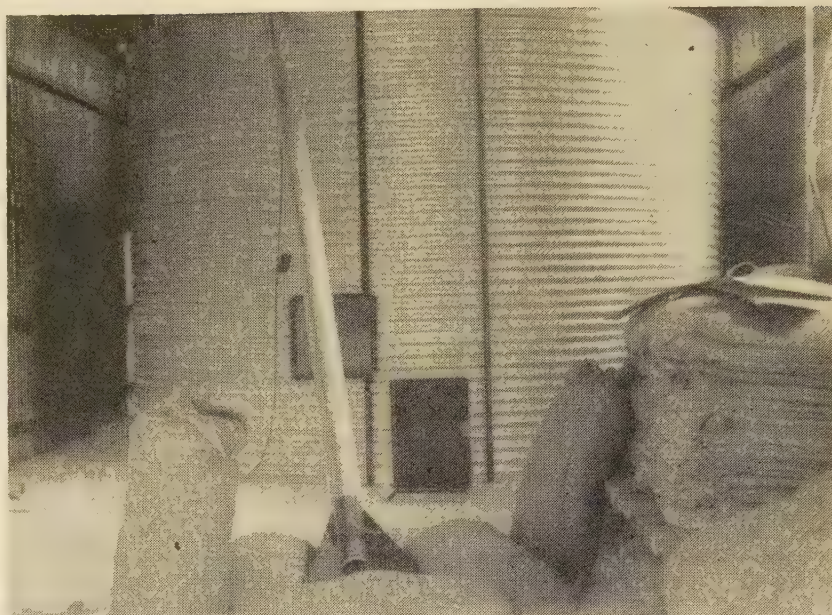
Where the soil is well drained and the aspect is favourable peas can be sown now, even in southern districts.

Peas do well in cool conditions and prefer a moist, well drained soil rich in humus. As they repay good cultivation, the ground should be deeply dug and have been manured, preferably in autumn, with organic material such as stack bottom, compost, or farmyard manure.

Dwarf varieties such as William Massey and Little Marvel can be grown without staking, but the rows should be kept earthed up to support the plants.

Potatoes

It is much too early yet in most districts to plant main-crop potatoes,



THE grain and feed store illustrated, which has just been completed on a poultry farm in the Waimate district, combines a store for feed such as poultry mash and a grain silo constructed of rounded corrugated metal and steel supports.

With bulk storage of grain wastage and damage are negligible, and there is a great saving in floor space compared with that required for bagged grain.

Bulk grain delivered to the farm can be quickly loaded into the silo with the auger shown in the foreground of the illustration. The auger is operated by a $\frac{1}{2}$ h.p. motor and can shift $11\frac{1}{2}$ tons of wheat per hour at a 10-degree angle and 4 tons per hour at a 90-degree angle.

For drawing supplies of grain from the silo there are two outlets, one at left of centre 3 ft from the floor for hand working and the other in the floor for working with the auger. The cover of this outlet is shown raised in the illustration.

but seed can be set to sprout in a box in a light, airy, frost-free shed or out-building. Well sprouted tubers planted shallowly in well drained soil in a favourable situation send shoots above the ground more quickly than do unsprouted ones. As frost is likely in many districts until late October and in some until early November, shoots of tubers planted in August are likely to be destroyed unless continuously earthed up.

The floor space of the combined store and silo is 900 sq. ft. (45 ft x 20 ft) and the height in front is 16 ft and at the back 14 ft. The silo is 15 ft in diameter and 10 ft 6 in. high. Its capacity is estimated at 1,445 bushels, a little more than 31 tons.

A moisture barrier of polythene is set in the 4 in. concrete foundations to the store, as moisture content of bulk grain has to be watched carefully.

To determine what a circular silo will hold it is necessary to find the cubic capacity in feet. This is then divided by 1.284 cub. ft., which is the space occupied by a bushel of grain.

The weight of the grain is got by multiplying the number of bushels by the accepted weight of a bushel of grain in New Zealand, which is: wheat, 60 lb, oats, 40 lb, barley, 50 lb, and maize, 56 lb.

—J. H. WARWICK,

*Poultry Instructor,
Department of Agriculture,
Timaru*

Rhubarb

August is a good month to establish a new rhubarb bed or to break up and replant an old one. Rhubarb is hardy, easy to grow, and yields heavily if well supplied with moisture and plant foods. The soil should be well drained and preferably well supplied with organic matter. The lighter soils that dry out are less suitable than the heavier, well drained soils.

Botrytis Control in Glasshouse Tomatoes*

By R. A. J. WHITE,

Horticultural Advisory Officer, Department of Agriculture, Auckland

FOR control of botrytis in glasshouse tomato crops regular cover sprays with zineb plus thiram or dichlone are strongly recommended. The recommendation is made after new fungicides, offered for the control of botrytis, were compared with older fungicides in a trial in an Auckland glasshouse to test their effectiveness when applied as a regular programme of overall sprays to a crop of tomatoes. These sprays are not a substitute for fungicides used with hormones for fruit setting, because if protection against petal infection by botrytis was not given by using a fungicide with the fruit setting hormone, the spray programmes recommended would probably have little effect.

FRUIT was set in the usual manner in the trial, a hormone fruit set combined with ferbam being used to control petal infection by botrytis. Spraying commenced in July and continued at weekly intervals through August, fortnightly in September, and weekly through October. Each week a count was made of the number of fruit infected with botrytis on each treatment.

Visual observations on the amount of leaf mould present on each treatment showed that dichlone and e.t.m. plots were practically free of leaf mould; zineb plus thiram, zineb plus captan, maneb and phaltan treatments were all lightly infected; and copper dimethyldithiocarbamate treatment was heavily infected.

Each spray programme was applied to six plots scattered at random through a glasshouse containing 3,600 tomato plants. Each plot consisted of half a bay or 72 plants in four half rows across a glasshouse. Only the centre two rows of plants in each plot were used for recording the number of infected fruits; the outside two rows on each plot acted as guard rows. Sprays were applied with a paint spray gun, supplied with compressed air at about 100 lb per square inch. The fungicide was applied to each treatment (432 plants) in about 1½ pints of water; no sticking or wetting agents were used. The treatments were applied 11 times during the trial.

Seven fungicides used are listed below in the order of efficiency they showed:

Zineb 65 per cent w.p. plus thiram 80 per cent w.p.

Dichlone 50 per cent w.p.

Zineb 65 per cent w.p. plus captan 50 per cent w.p.

Copper dimethyldithiocarbamate 42 per cent w.p.

Phaltan 50 per cent w.p.

Maneb 80 per cent w.p.

E.t.m. 30 per cent w.p.

Value of Spraying

Some growers doubt whether spraying has any value in the control of botrytis. Though even the best fungicides used in this trial did not completely eliminate botrytis, the difference between the best and worst treatments certainly justified spraying.

One hundred and twenty-one fruits infected with botrytis were collected from the six plots receiving the best

treatment, and 293 from the worst treatment.

If the grower had been using the worst treatment for the whole house, 2,862 fruit which could have been saved by using the best treatment would have been infected with botrytis. As the fruit from this property averaged seven fruits per pound, this represents just over 20 cases of tomatoes.

This season 20 cases of tomatoes would have realised at least £40, and this would have more than repaid the cost of labour and materials for spraying.

However, even the worst plots were not as heavily infected as some other glasshouses on the same property and in the district. In a 1959 botrytis trial the level of infection was so high that over 100 cases would have been lost from a house of the same size in one month.

Recommendations which can be made as a result of this trial:

The best programmes used in the trial appear to be zineb plus thiram and dichlone. I would recommend growers to use one of these programmes, if possible, in preference to the alternative programmes zineb plus captan, copper dimethyldithiocarbamate, or phaltan.

Unfortunately the zineb plus thiram programme seemed to have a definite hardening effect on the plants. This was most noticeable just as they reached the wires. Plants on the dichlone plots were 6 in. taller than plants on the zineb plus thiram plots at this stage. This hardening of the plants may cause a reduction in the yield of salable fruit.

Skin irritation and allergy affect some people when handling plants or fruit treated with thiram and a few

COST OF MATERIALS USED IN SPRAYING PROGRAMME

Programme	Cost per pound of fungicide	Rate of use per 1,000 mature plants	Cost per application per 1,000 plants	
			s. d.	s. d.
Zineb	7 10	4 oz	1 11½	
plus Thiram	8 0	plus 3 oz	1 6	3 5½
Dichlone	20 0	1½ oz	1 10½	1 10½
Zineb	7 10	4 oz	1 11½	
plus Captan	7 9	plus 8 oz	3 10½	5 10

* Condensed from the author's original paper published in the April 1961 issue of "New Zealand Commercial Grower".

people are allergic to dichlone, but these cases are much less common than cases of thiram-induced allergies. Captan is an extremely safe fungicide in respect of allergies.

The zineb plus captan programme used in this trial left a heavy white deposit on the fruit and on the plants. Zineb plus thiram also left a slight deposit, but dichlone left no visible residue and also gave extremely good control of leaf mould.

Costs of materials used in these programmes are shown in the table at the bottom of page 55.

Application Rates

It is most important when using any of these spray programmes to apply sprays at regular weekly intervals when botrytis infections are likely. This is necessary to provide protection to the new growth and fruit because these organic fungicides have a relatively short period of effective fungicidal action. The amount of water used is immaterial when applying these programmes with a compressor and paint spray gun, and growers are recommended to use whatever quantity of water they find most convenient.

The table below recommends the amount of fungicide to apply to each 1,000 mature plants, a mature plant being considered as a plant which is 5 ft or more high. The fungicide applied should be in proportion to the height of the plant (half quantities would be applied to plants 30 in. high).

It is important when using dichlone not to exceed the recommended rates, as the material is sometimes phytotoxic at greater strengths. Only one rate of application was used in this trial and it is not known if lower rates would give the same results or if higher rates would give better results when applied with paint spray guns.

RECOMMENDED RATES OF APPLICATION

Programme	Wet spraying	Dry spraying
	lb per 100 gallons	oz per 1,000 mature plants
Wettable powder	lb	oz
Zineb 65 per cent	.. 2	4
plus	plus	plus
Thiram 80 per cent	.. 1½	3
Dichlone 50 per cent	.. 2	1½
Zineb 65 per cent	.. 2	4
plus	plus	plus
Captan 50 per cent	.. 4	8

Acknowledgments

To G. P. Tregidga for allowing the trial on his property and for providing equipment, and to firms who supplied the fungicides.

A Simple Water Level with Many Uses for the Handyman Farmer

THE water level described and illustrated in this article has been developed by the Soil Conservation staff of the Department of Agriculture at Palmerston North for setting out in the field guide lines for contour and graded furrows and banks. It has given excellent service, being sufficiently accurate, very easy to use, and much faster in operation than the "dumpy" level.

The instrument's performance has been compared with the "dumpy's" for taking all types of levels required for drainage work, including contouring, laying out and checking drain grades, laying out guide lines on grade for mole drainage, and setting out cut and fill for land levelling. For all these jobs the water level can be operated with accuracy by people with no special training. All readings are direct and easily interpreted and every

reading can be checked as work proceeds.

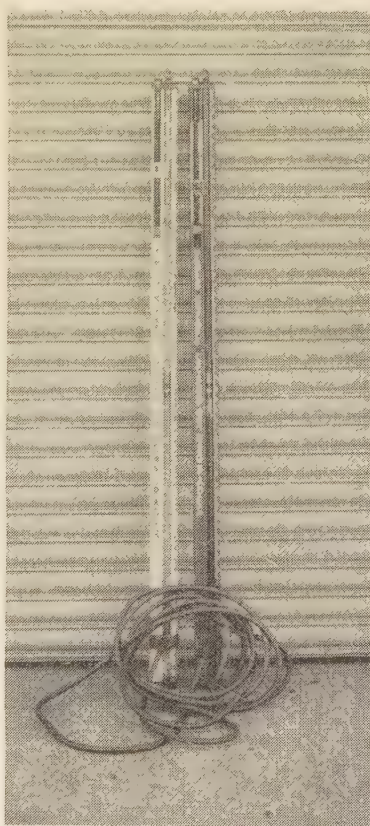
Other uses of the level include marking out falls for concrete floor work, checking rises and falls in pad-dock levelling, and the grading of V and open drains. It would be ideal for levelling playing areas such as bowling greens and tennis courts.

This simple, robust water level, known as the aqua level, is now being manufactured for Departmental use and would be a valuable acquisition to the toolkit of a handyman farmer.

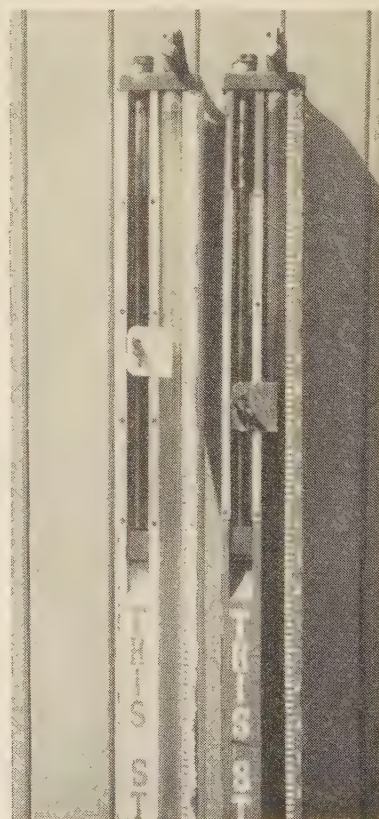
Inquiries about the level should be sent to the Department of Agriculture, Palmerston North.

—K. R. HUMPHRIES,

Department of Agriculture,
Palmerston North



The differently coloured staffs of the level indicate clearly which leads on up grades and which leads on down.



Head of level with adjustable grade plates that permit the instrument to be operated accurately by people with no special training.

Bamboo Ladders and Tripods are Easy to Make

THE enormous strength and lightness of bamboo make it eminently suitable for different types of constructions where these factors are of primary importance. Some of these constructions, such as ladders and tripods, are so simple that every person who can handle the ordinary range of tools can make them. In this article J. C. Gerlach, Farm Advisory Officer (Agronomy), Department of Agriculture Rukuhia Soil Research Station, Hamilton, describes how two types of ladders—the ordinary ladder used on farms and in the household and the three- or four-legged stepladder used by orchardists for pruning and picking—can be made.

LADDERS

FOR the construction of a ladder, say, 10 ft long and 16 in. wide, as commonly used by tradesmen, two straight bamboo stems of 2 to 3 in. diameter and one of about 1 in. diameter are required. The latter is needed for the rungs. If two full-length stems (20 to 30 ft) are available, the thinner top parts of these could also be used for the rungs.

With a fine-toothed carpenter's saw or a hacksaw 10 ft of the basal ends of the two stems are cut off and eight or more rungs are cut from the 1 in. bamboo (or from the tops of the full-length thick stems). The ends of each rung are bevelled below so that both ends are more or less wedge shaped. This will prevent the rungs from turning in their sockets.

Holes are then bored in the two thick stems with an adjustable bit or

cut with a gouge chisel to fit each rung. The holes should be made at a convenient spacing (12 to 14 in.) between the nodes. When the rungs are fitted into the two 10 ft poles two loops of 12 to 16 gauge wire are drawn round

Points to Remember

IN the making of articles from bamboo the following points must be considered:

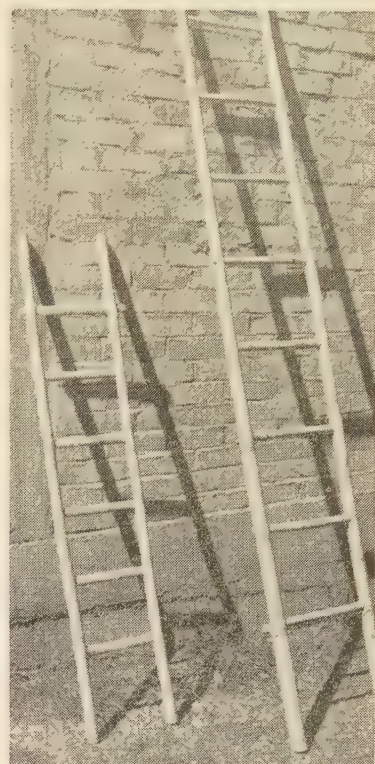
① Only mature stems of 3 years or older should be used for constructional work. Younger stems and those which have died in the clump are of little use, since they crack and do not last. The varieties with a smooth, glossy skin lose their gloss when picked too early.

② Nearly all bamboos have a hollow, partitioned stem with a comparatively thin wall. The bamboo differs from ordinary trees, in that the greatest density of the strong fibre bundles, which run lengthwise, is on the outside of the stem wall. Consequently the outside is the strongest and hardest part and the stems can be split into strips lengthwise only. If strips are used, it is advisable to smooth the sharp edges off to prevent nasty cuts.

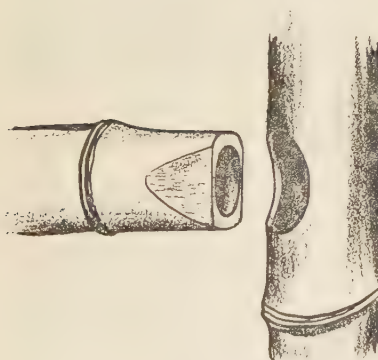
③ Different methods of construction are required, as nails or wood screws do not hold well in bamboo.

④ The appearance of the varieties without a glossy skin can be improved by lightly sanding the skin with fine grade sandpaper and applying a coat of varnish. This will also improve the durability of ladders and tripods left outside.

Experiments seeking ways to increase the durability of bamboo in contact with the soil and the air are under way and results will be published as soon as they are available.



Bamboo ladders made and in use at Rukuhia Soil Research Station. The one on the left has slats for rungs and the one on the right has round rungs.



The wedge-shaped end of the rung placed in the upright prevents the rung turning. The drawing at the top, which is a vertical view from the top of the upright, shows the position of the inserted rung.

the top and bottom ends of the ladder and are fastened just below the top and the bottom rungs. When the wires are twisted with a 4 in. nail sufficiently to tighten the construction, a small bamboo peg is placed in the opening left by the nail and is rested against the rung. If after long use the ladder becomes slack, a few more twists of the wires will tighten it again.

A ladder 10 ft 4 in. long and 20 in. wide made at the Rukuhia Soil Research Station (shown at right in illustration above) weighs 13½ lb, compared with the 24½ lb of an Oregon pine ladder 10 ft 7 in. long and 16½ in. wide, the cost of the bamboo ladder being only 5s. for the material.

Constructional Variations

The same illustration shows a 6 ft 4 in. x 14½ in. ladder weighing 6 lb for use inside the house. In this construction split bamboo strips ¼ in. thick and about 1½ in. wide have been used for rungs. Since all these slats can be made the same size, no carefully measured round holes have to be bored, as the slats will fit into slits of

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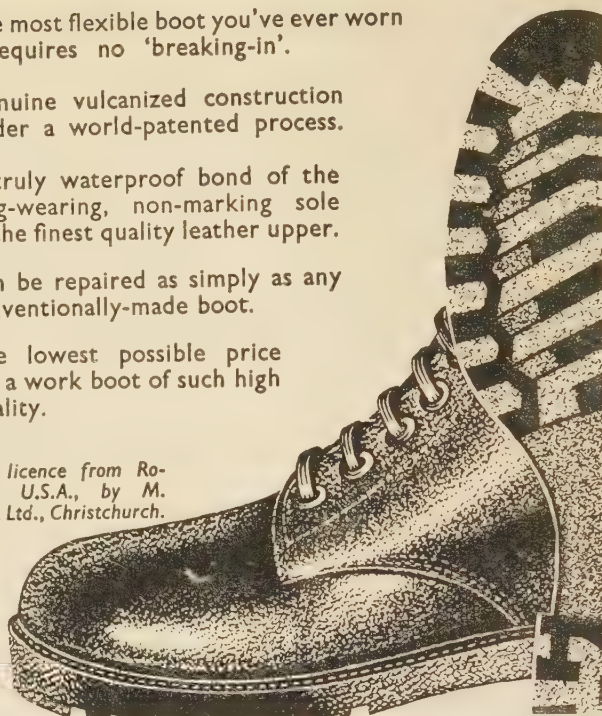
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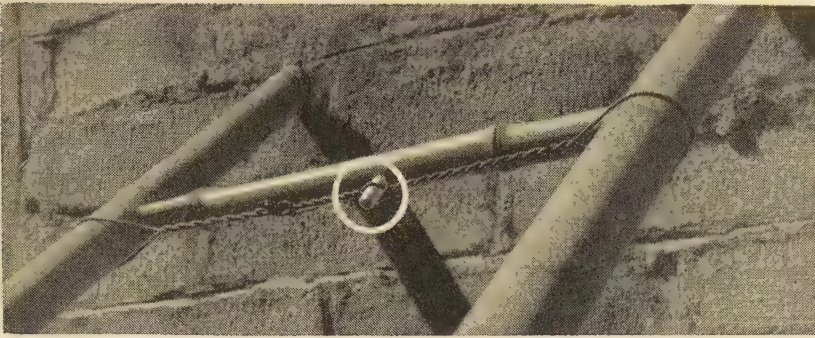
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Top of a ladder with round rungs, showing wiring and bamboo peg (in circle).

the same size cut lengthwise into the two poles with a chisel.

If the slats are used instead of round rungs, it is advisable to make the ladder not wider than about 16 in., not because the slats would break, but because longer slats will tend to twist out of position and then bend and so might slip out of their sockets. The ladder shown has carried a 15-stone man several times without collapsing. Instead of wire loops being used for fastening, the top and bottom slats usually go right through the poles, being wedged on the outside by conical shaped bamboo pegs driven through holes bored in the slat. (The slat ladder illustrated on page 57 is pegged only on the top rung and is wired at the bottom.)



Top rung of a ladder with slats, showing how it is fastened with a peg (in circle).

Though a ladder constructed in this way is even lighter than one with round rungs, the latter is preferable for those who have to stand on it for a long time, such as painters, since the thin edge of the slats is less comfortable. Those who consider the described methods of fastening not strong enough could use $\frac{1}{4}$ in. steel rods going right through the round rungs (or behind the slats) with washers and nuts screwed on at each end.

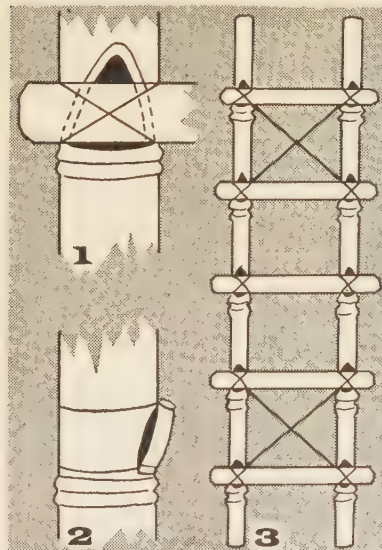
An alternative construction used in India is to cut shallow notches just above the nodes in the uprights, strips

of bamboo being used for rungs. These, about 1 to $1\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. thick, are placed in the notches as indicated in the illustration below and wired on to the upright. To increase rigidity of the ladder crosswires are tied between the top two rungs and between the bottom two rungs.

Stepladders

Three- or four-legged stepladders can be built by the methods described above. For orchard pruning and picking fruit the type with uprights converging toward the top are usually preferred, as they can be moved closer to the tree. Consequently the rungs become shorter as the uprights converge. The top rung goes right through the three or four legs and is wedged with conical pegs on the outside.

For a three-legged ladder it is desirable to make a tight fit of the three



Method used in India of making a ladder with slats. 1 and 2—Shallow notch cut to take slat. 3—Slat fastened to uprights by wiring. The cross-wires at the top and bottom give greater rigidity.



A three-legged bamboo stepladder for pruning and picking fruit and for other garden work.

ward movement of the supporting leg. A four-legged stepladder is sometimes preferred for better stability; the two supporting legs of these are joined at about half the height with a round rung fastened with a twisted wire as already described, or with a slat going right through, the ends of this being cut into half the width and pegged on the outside.

The following large bamboo varieties can be used for the construction of ladders and stepladders, the dimensions given being those in the North Island:

Bambusa oldhami (syn. *Sinocalamus oldhami*), 30 ft x 2 to 3 in.

Bambusa arundinacea, 20 to 35 ft x 2 to 4 in.

Dendrocalamus latifloris, 30 to 50 ft x 3 to 5 in.

Phyllostachys bambusoides, 25 to 40 ft x 1 to 3 in.

Phyllostachys marliacea, 25 to 30 ft x 2 to 4 in.

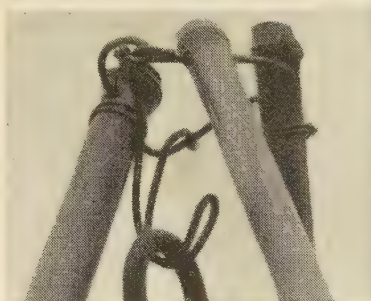
Phyllostachys castillonis, 25 to 40 ft x 2 to 4 in.

The first three varieties are clump types suitable for warmer areas with light frosts only. The *Phyllostachys*

BAMBOO LADDERS AND TRIPODS



A bamboo tripod with scales used for weighing yields from experimental plots at Rukuhia.



The top of the tripod illustrated at left, showing details of wiring.

varieties mentioned are slow spreaders and can stand at least 16 degrees of frost without injury.

TRIPODS

Scales hung on a tripod are often used for weighing produce on farms and market gardens. Since such a tripod has to be carried from one plot to another, the lighter it is the better. Bamboo lends itself very well to this purpose, as its compressive strength is 1 to 6 tons per square inch, depending on the variety.

Three bamboo stems of about 1 in. in diameter and 6 to 7 ft long and a

piece of No. 8 fencing wire are all that is required for a tripod. Holes are bored in the top ends of the three bamboos, which are joined by the wire, on which a hook fashioned from one end of the wire is fastened as indicated in the illustration at left.

An alternative way of fastening is to put a wire ring through each hole and join them with a steel chain from which the hook is suspended. A tripod with 6 ft 6 in. long legs as shown and used at Rukuhia weighed just over 4 lb, yet it carried the weight of the 12-stone man who made it.

A number of bamboo varieties available in New Zealand produce stems of suitable size for tripods, ladder rungs, etc. Some are, the dimensions given being those in the North Island:

Phyllostachys aurea, 12 to 25 ft x 1 to 2 in.

Phyllostachys nigra, 15 to 25 ft x 1 in.

Phyllostachys mitis, 25 to 35 ft x 1 to 2 in.

Bambusa tuldoidea, 25 ft x 1 in.

Bambusa ventricosa, 25 ft x 1 to 1½ in.

Bambusa fastuosa, 20 ft x 1 in.

The first three are rapid spreaders and very hardy. The three *Bambusas* mentioned are clump types and can stand about 15 degrees of frost once they are established.



"Animal Husbandry Heresies": Dr Allan Fraser

IN his introduction to "Animal Husbandry Heresies" Dr Allan Fraser describes the contents of his book as "the personal views of one man who, over a period of forty years, has attempted to reconcile orthodox agricultural science with his own observations on the farm, and in several respects has failed in that attempt".

As the above description indicates, this is a book of evaluation and criticism. The book, which is in four sections, begins with a discussion and criticism of breed societies, pedigree registrations, and livestock shows, and the first section ends with quite a lengthy evaluation and criticism of the science of genetics and its contribution to animal production. The next section deals with environment, the relative importance of environment and heredity, the effect of hormones on animal production, the chemical analysis of foodstuffs, and a criticism of scientific feeding standards. The

other two sections deal mainly with techniques which may be used in the future to improve the volume and quality of animal products.

Geneticists, nutritionists, and a section of farmers are criticised, and many of their practices ridiculed. Geneticists in particular are rebuked sharply and frequently, though some of the criticism is unfair and unwarranted.

For instance, discussing the fact that production in the best dairy herds is three times as great as the average, Dr Fraser suggests that pedigree cattle breeders claim this to be due to the superior genetic quality of the cattle in the best herds. He then says: "The modern geneticist supports the breeders' pretensions because they serve to magnify the importance of his own speciality".

Since geneticists in both Britain and New Zealand have shown that only a small proportion of the difference in production between herds is due to breeding, Dr Fraser's comment is hardly accurate or fair.

Much of the material is very interesting and instructive, though it seems that in some cases changes are suggested (for example, to zero grazing with dairy cattle) without an assessment of all the relevant evidence.

The book is very well written, and contains many interesting and enjoy-

able anecdotes and analogies. It can be recommended to farmers and students who are interested in the sciences of genetics and animal nutrition as a book which will promote interest, thought, and perhaps some soul searching.

—J.D.J.S.

Crosby Lockwood and Son Ltd.,
London. 16s.

"List of Diseases of Animals"

A MANUSCRIPT with this title has been in preparation for some years under the aegis of the World Veterinary Association and with the help of a committee of veterinary surgeons representing the principal livestock producing countries. The aim is to ensure correct naming and reference to animal diseases wherever they occur.

To assure recoupment of publishing costs of such a comprehensive and authoritative work the World Veterinary Association would appreciate pre-publication orders (approximately 30s. sterling per copy) or indication of readiness to order on publication. These may be sent to the liaison authority in New Zealand, the secretary to the New Zealand Veterinary Association, P.O. Box 106, Hamilton.

Radioactive Materials in Food and Agriculture

RADIATION sickness can occur in two ways: from direct exposure to large doses of external radioactivity and/or by ingestion of highly radioactive materials. In a nuclear catastrophe sickness from contaminated foods could be widespread; deaths would be painful and slow.

A BOOK with the above title which was recently published by the Food and Agriculture Organization of United Nations evaluates health hazards associated with contaminating radioactivity in human diets. It is a book for the expert. But from this and other sources some idea can be gained of what radioactive contaminations could mean to food producers and consumers. Here are some questions and answers:

What are the Sources of Radioactive Contamination?

Minute and harmless amounts of natural radioactivity have always been present everywhere. Some contamination does result from applications of atomic energy for peaceful purposes, including the use of radioisotopes in scientific research. Rigid controls ensure that amounts from these sources are almost invariably harmless.

By far the most serious threat is from "fall-out" caused by explosions in nuclear weapon testing. From this source the predominant radioactive elements are isotopes of iodine, caesium, and strontium. Of these, one

form of radiostrontium presents the most important long-term hazard.

What Foods can be Affected?

Virtually all. Contamination from sea foods is usually very small compared with the contribution to diets from land sources. Aerial contamination may be deposited directly on leaves, flowers, fruits, and seeds of crops. Some radioactivity may be absorbed into plants from these surfaces or from soil. Animals grazing contaminated feeds may concentrate the radioactivity, which could then reach human populations via animal food products. For countries with a high standard of living radioactivity could reach its most serious proportions in milk.

What Would be Necessary in an Emergency?

This would depend on the type and severity of contamination. Changes in diet or farm management might be necessary. Decontamination procedures could include some of the following.

Soils and plants: Removal of contaminated grass sod; deep ploughing;

in special cases treatment of affected soils with lime or other chemicals.

Vegetable produce: Washing, scrubbing, or skinning.

Livestock: Removal to shelter with uncontaminated supplies of feed and water; restriction to smallest possible area of contaminated pasture.

Animal products: Chemical treatments to remove radioactive contaminants.

Emergency measures would be applied only when declared necessary by responsible authorities.

What is the Present Position?

In the United Kingdom radiostrontium contamination from nuclear explosions reached a peak in 1959. However, the estimated level in the diet was then only about one-twentieth of that considered dangerous. In New Zealand existing contamination is much lower than that found in the United Kingdom. Nevertheless, the New Zealand Departments of Health and of Scientific and Industrial Research continue to keep a careful watch on radioactivity in milk and other substances.

This work is being extended. Results are routinely available to the Department of Agriculture.

At present atmospheric levels of radioactive contamination are falling and will continue to fall if large-scale nuclear explosions are not resumed. Meanwhile, there is no significant danger from either past weapon tests, or the continuing use of radioisotopes in peaceful pursuits such as agricultural research.

—E.D.A.

Information Sought about Red-billed Gulls

THE cooperation of the public in supplying information about banded birds is sought by the Ornithological Society of New Zealand (Inc.) in its study of the red-billed gull (illustrated at right).

One of the three species of gull native to New Zealand, red-billed gulls were first banded in 1943-44 at Nelson under the direction of the University of Otago, and since 1950, under the banding scheme of the society in collaboration with the Dominion Museum, some 4,600 birds have been banded. All birds carry an aluminium band bearing the inscription "Send Dominion Museum New Zealand" and a serial number. Most birds have been banded at the breeding colonies on Kaikoura Peninsula and some of these have been found as far north as New Plymouth and as far south as Dunedin.

This year the birds carry a colour band in addition to the aluminium

band. Close to 4,000 chicks in six colonies within the middle districts of New Zealand were banded, different colours being used for each colony.

All chicks banded this season carry a metal band on the right leg and a colour band on the left leg. This sequence will be changed yearly to enable age groups to be established.

Wherever large numbers of red-billed gulls concentrate, for example, the Avon-Heathcote estuary, at Christchurch, Wellington harbour and bays, the Marlborough Sounds, and on other beaches and inland farmland, colour-banded birds will be seen from early February until the end of winter and possibly throughout the whole year.

Whoever observes a colour-banded bird is asked to report to the Dominion



Museum, Wellington, the colour of the band and the date and place where the bird was seen.

If a banded bird is found dead, the band or bands should be taken off and returned to the Dominion Museum. If a banded bird is caught alive and healthy, the band should **not** be removed, but the number on the aluminium band should be reported to the Dominion Museum with the date and place the bird was seen or caught, and the bird released.

ROUND THE RESEARCH STATIONS

Current Work and Findings in
Department of Agriculture and
Department of Scientific and
Industrial Research Trials
and Experiments



Ruakura

Rearing Crossbred Dairy Calves for Beef

Large numbers of bobby calves from dairy farms are slaughtered each year with a consequential waste in possible meat production. This is particularly serious under the present economic conditions of low butter prices and adverse balance of payments, but with satisfactory prices offering for boneless meat.

The possibility that calves not required for herd replacement may be reared cheaply on milk substitutes, or suckled on "throw out" dairy cows for beef and veal, is being investigated in a series of trials at Ruakura Animal Research Station. These experiments are designed to study factors such as the most suitable types of crossbreed, initial rearing on whole milk for limited periods, the relative merits of buttermilk and skim milk powder, the effect of addition of high-energy fat such as tallow to the diet, early and late weaning, simplified management practices, and the incidence and importance of disease.

Preliminary results emphasise the economic feasibility of such a project for the dairy farmer.

Wallaceville

Combined Cobalt and Selenium Responses

Lambs at Wallaceville's Kaitoke farm on Kopua and Dannevirke silt loams responded to both cobalt and selenium doses. There was no evidence from weight changes that one element had any effect on the function of the other.

Hop Research Station

Production of Semi-seedless Hop Varieties

As in Britain, hops in New Zealand are grown "seeded" at present. This is done by interplanting commercial gardens (at the rate of 1:80) with male plants, which throw pollen at the time the female plants are in flower.

However, with the increased production of lager beers, the demand for hops with a low seed content is rapidly increasing.

One way to cope with this problem is to follow the example of Continental countries and eliminate the male plants. But as hops in New Zealand have spread well outside commercial gardens and are found growing wild everywhere, this method would be only partly successful.

A different approach is the breeding of polyploids (that is, tetraploid, or preferably triploid, varieties), which cannot be other than practically sterile and so semi-seedless. This result is attained by treating vigorously growing tips of shoots of ordinary diploid varieties of hops with colchicine, thus affecting the normal cell division and producing tetraploid tissue. These tetraploids are then used in controlled crosses with diploid males and the outcome will be semi-seedless triploids.

However, there are indications that it is not necessary to go as far as breeding for triploid hop varieties. From shoots of the commercial Californian variety treated with colchicine in the spring of 1954 two semi-seedless hop plants have been obtained without the need to cross them with diploid males. This suggests that the tetraploid hop plant is less fertile than ordinary diploid, as was found earlier with the tomato.

HEADING PHOTOGRAPH: Aberdeen Angus cross Jersey calves feeding at a multiple suckling device.

At present this colchicine technique is being applied to the new varieties of hops tolerant to root rot bred at the Station (discussed in "Round the Research Stations" on page 605 of the December 1960 "Journal") with the aim of producing a first-class semi-seedless hop for the world market.

Wallaceville

Safety of Hormone Weedkillers to Stock

In the concentrations in which hormone weedkillers are used they are themselves harmless to stock that may graze freshly sprayed vegetation. There is evidence, however, that some hormones will make normally unpalatable poisonous plants like hemlock acceptable to stock and that the nitrate content of plants may be greatly increased. The last effect can be important in plants like variegated and winged thistles, which often have a high nitrate content anyway when rains cause rapid growth after drought. Added nitrate content coupled with increased palatability could be a dangerous combination. Stock should be kept away from freshly sprayed poisonous plants for some days.

Statements above about the harmlessness of weedkillers to stock do not apply to dinitro-sec-butyl phenol or endothal. These substances could be toxic to stock grazing freshly sprayed vegetation, though Wallaceville knows of no confirmed cases.

Invermay

Time of Mating of Ewes

Several investigators have established that the average number of eggs shed by ewes at each heat period increases as the breeding season progresses and then declines. It seems probable, therefore, that ewes mated at this peak of ovulation will produce more lambs than if they are mated before or after this.

In a field trial five groups of ewes were put to the ram successively at 17-day intervals from the beginning of the breeding season. By mating each group to Romney rams for 17 days and then to Southdown rams for the remainder of the breeding season it was possible to examine the level of fertility in these specific 17-day periods and to determine the total number of lambs born to each group.

A peak of ovulation, as shown by an increase in multiple births, was found in those ewes mated to Romney rams between mid April and the beginning of May.

Delaying mating until this time, however, did not result in an overall increase in lambing percentage because of the considerable overlap in the total mating periods of the earlier mated groups.

Wallaceville

"Q" Disease in Chickens

For the past four years there have been numerous cases of a disease in young chickens which has been designated "Q" disease because all attempts to determine its cause have been unsuccessful. It occurs in well grown thrifty chickens aged

from nine to 30 days. Affected chickens die suddenly in a convulsion, with the head thrown back and legs outstretched.

On post-mortem examination the most striking feature is an excess of clear fluid in the sac surrounding the heart, slightly enlarged liver with haemorrhages around the borders of the liver, and enlarged pale kidneys. The gizzard and first part of the intestine usually contain a blackish fluid.

Studies at Wallaceville Animal Research Station to date do not indicate that the disease is infective, though there has been some field evidence that the condition occurs in certain lines of chickens. The possibility of its being due to some nutritional condition has been investigated, but this approach has not been successful, though it would still seem to be the most likely source of the trouble.

Typical attitude of chickens at death.

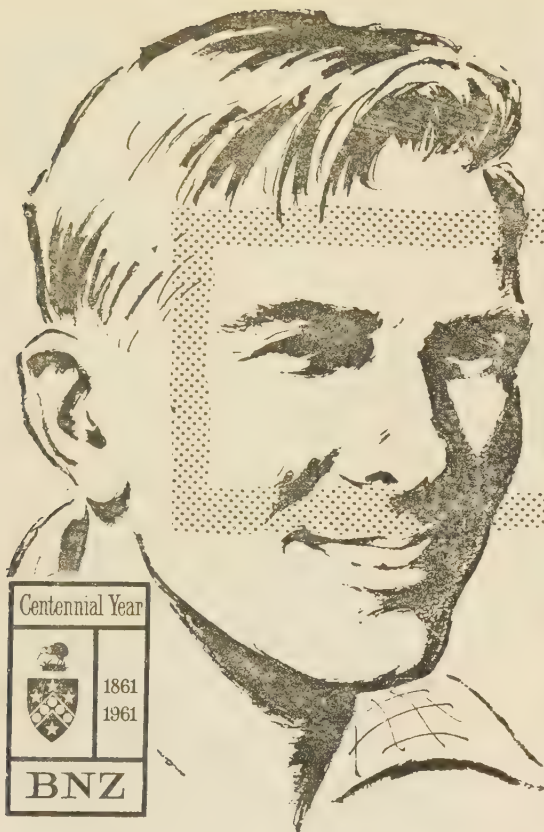


Heart of chicken, showing excess of fluid in pericardial sac.



Originally mortalities up to 10 per cent were recorded, but in the last season some breeders have reported that it is occurring earlier, and the mortality rates are increasing, up to 25 per cent.

As the Station is anxious to obtain as much information as possible on the disease, poultry keepers are urged to get in touch with their Poultry Instructors when any condition which might be "Q" disease occurs in their flocks.



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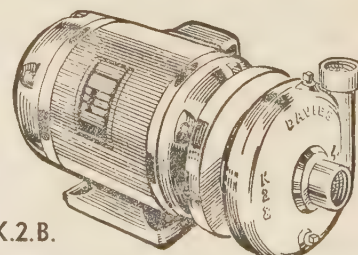
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K.2.B.

Eradicating Kikuyu Grass by Spraying

By P. F. GOULDING,

formerly Fields Instructor, Department of Agriculture, Hamilton

A SUCCESSFUL method of controlling kikuyu grass (*Pennisetum clandestinum*) by frequent cultivations with the rotary hoe through summer, followed by a winter and summer cropping programme with the area then being sown to permanent pasture, was described by D. L. Janett in the April 1960 "Journal of Agriculture". Now, after further farm research with chemicals a successful way of controlling the plant by spraying has been discovered.

IN February 1958 an experiment began on a north Waikato sheep farm where the plant had developed into a serious menace over the past 25 years or so. Dalapon, amitrol, TCA, and sodium chlorate were selected as the four materials most likely to kill this weed, and a programme of monthly spraying with these weed-killers was started. After the first spraying it was quite obvious that neither TCA nor sodium chlorate was as effective as dalapon or amitrol, and so they were eliminated from the succeeding monthly treatments. By January 1959 it was clear that dalapon was the most likely material to give complete control.

The plots were frequently inspected, and in April 1960 it was noted with

surprise that summer appeared to be the best time to spray. On the plots treated on 18 December 1958 there was from a 95 per cent to complete kill. The autumn treatments were less encouraging, but certainly worth while. Late autumn, winter, and early spring sprayings proved ineffective.

Dalapon Best Material

Dalapon appeared to be the best material to use, and summer seemed the best time to use it. The next questions were what was the best rate and how many sprayings were necessary for complete eradication. To answer these questions comparative plots were treated at 10 lb per acre and 20 lb per acre on 16 October, 1 December, and 22 December 1959.

Though the December 1958 treatment had given almost complete control, by December 1959 the odd one or two plants which survived were flourishing, and obviously the kikuyu grass would in time take charge again. Consequently, in the 1959 treatments half of the plots were sprayed again with 10 lb of dalapon per acre about two months after the first spraying. (See table below.) This was designed to kill the few plants which survived the initial treatment.

Plot	Date of first treatment	Rate lb per acre	Date of second treatment	Rate lb per acre
1	16/10/59	10	1/12/59	10
2	16/10/59	20	1/12/59	10
3	1/12/59	10	18/2/60	10
4	1/12/59	20	18/2/60	10
5	22/12/59	10	2/3/60	10
6	22/12/59	20	2/3/60	10

A knapsack spray outfit was used to apply the material and all plots were duplicated.

By early autumn all plots were a mat of dead foliage with a good number of white clover plants and a few ryegrass plants appearing. The fertility of the soil was high.

Because of this result it was decided to try to establish a dense sward of tall winter- and spring-growing species to smother any kikuyu plants which might remain in the plots. Therefore, on 21 March 1960 the area was given



Trial plots showing effects of monthly treatments up to September 1958. The upper area at extreme right has been treated with 20 lb of dalapon per acre and that below it with 20 lb of amitrol.

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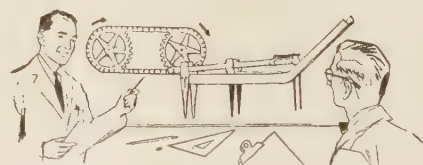


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several cuts with disc harrows traveling up and down the plots and also on the angle. After this, the plots were heavily hand raked to imitate harrowings and the surface of the ground was sufficiently bared to enable a reasonable amount of the grass seed to fall on it.

Thirty pounds of certified grass seed per acre were broadcast by hand (15 lb of Italian ryegrass and 15 lb of short-rotation ryegrass) and the area was topdressed with 2 cwt of superphosphate per acre. Heavy rain followed and sheep trampled the seed into the ground as they grazed the field. The result was excellent and a very good ryegrass sward was established. Later, however, the grazing animals confined their attention mainly to the plots and avoided the surrounding field, and it was necessary to fence off the plots until spring.

On examination in early October the late December treatments proved easily the most effective. However, in the half that had received only the initial spraying one or two kikuyu plants could be found in both series, but in the half that had received a further 10 lb of dalapon per acre on 2 March 1960 not one plant had survived.

Summary of Recommendations

(a) For chemical control of kikuyu grass spray with 10 lb of dalapon per acre in summer to early autumn. This is a job which should be tackled immediately after haymaking, as most farmers should have time then to attend to it. Kikuyu is best sprayed when it is short and under grazing.

(b) The area should receive a further 10 lb of dalapon per acre two to two and a half months later. This is vital.

(c) Four to five weeks later thoroughly disc harrow and remove the litter. Heavy tine harrows could then be used to disturb the surface and allow the grass seed which is then broadcast to make contact with the ground.

(d) Sow 30 lb per acre of a 50-50 mixture of certified Italian and short-rotation ryegrass.

(e) Topdress with 1 to 2 cwt of superphosphate per acre.

(f) If stock show a grazing preference for the area, erect a fence and leave it there for winter.

(g) Remove the fence in spring.

(h) If any surviving plants are noted, spot spray with a solution of 2 oz of dalapon to 1 gallon of water. A knapsack spray outfit would be the most suitable equipment for this.

Laboratory Site Chosen for Wool Research

THE Wool Research Organisation of New Zealand has accepted an offer of a long-term lease of a 6-acre block of land from the board of governors of Canterbury Agricultural College, Lincoln, for its laboratories.

BUILDING is not expected to start for at least 18 months, but a shelter belt will be planted and trees and shrubs are to be set aside in the College nursery for planting on the site.

The laboratory to be built on the Lincoln site will be a maximum of 30,000 sq. ft. and will be of one or two storeys. It will be designed to allow expansion.

The structure will be in brick to conform with other buildings at the College. Detailed planning of the laboratories will not be done until the appointment of the director of the organisation. It is hoped that the post will be filled before April next year.

Similar research associations exist for other New Zealand industries, two of which are the Dairy Research Institute and the Meat Industry Research Institute.

The organisation, which is financed jointly by the New Zealand Wool Board and the Government, will concentrate its activities on crossbred wool, of which New Zealand is a major producer.

Besides conducting work on the physical, chemical, and biological properties of wool, the organisation will examine such aspects as handling, storage, transport, and marketing.

Grants will be made for research and other scientific work into breeding, feeding, and management of sheep in so far as these affect primarily the quantity and grade of wool produced.

Wool research is at present undertaken in New Zealand by Canterbury and Massey Agricultural Colleges, the Wool Industries Research Institute, Dunedin, the Dominion Laboratory of the Department of Scientific and Industrial Research, and the Wool Testing Laboratories of the Department of Agriculture. Close association with these bodies in their work on wool will be maintained by the new Wool Research Organisation. In about five years it is hoped to have the new buildings finished, equipped, and staffed. In the meantime recruited staff will be seconded to existing organisations to gain experience and do research work until the new buildings and equipment are ready.



The executive of the Wool Research Organisation. Seated (left to right): Dr W. M. Hamilton, Department of Scientific and Industrial Research; Mr C. H. Bethell, N.Z. Wool Board (chairman); Mr C. Hilgendorf, Council of Scientific and Industrial Research. Standing: Messrs C. P. McEvedy (secretary); F. R. Callaghan, N.Z. Wool Board; J. E. Duncan, Department of Agriculture; A. Briscoe Moore, N.Z. Wool Board; I. K. Walker, Council of Scientific and Industrial Research; L. P. Chapman, N.Z. Wool Board.

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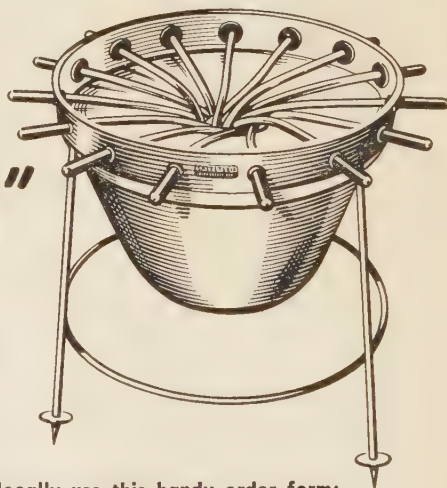
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The Mole Plough and its Function

By K. L. MAYO,
Farm Advisory Officer,
Department of Agriculture, Palmerston North

THE mole plough is a very cheap farm implement compared with other farm implements. On clay or partly clay soils with impeded drainage this plough is very valuable and when properly used will give spectacular results. It has a beam which connects the working end (the blade, torpedo, and plug) with the drawbar, which is hitched to the tractor drawbar. The beam also provides a basis for locking the blade in the working position, minor adjustments for depth, and a place to fit an axis pin about which the blade revolves.

The Blade

The blade is a piece of steel usually $\frac{1}{2}$ in. thick with a wedged-shaped leading edge to assist its being drawn through the ground.

Blades can be thicker than $\frac{1}{2}$ in., and such blades probably cause more fracturing of the ground. However, they should not be thicker than $\frac{1}{2}$ in. for the first 6 in. above the torpedo, as this will cause a too-large blade slit in the ground, with the result that after a short time the mole channel will usually collapse at its junction with the blade slit.

The width of the blade is not of great importance as long as the blade is strong enough to do its work. The larger mole ploughs usually have wider blades.

The blade rotates on an axis pin set into the beam of the mole plough. Well made blades will have two holes to permit the mole drains to be drawn at different depths, usually about 18 in. and 23 in.

The first signs of wear are visible on the leading edge of the blade immediately above the torpedo and this part should be built up before it is too worn; when it is no longer practical to build up the worn part the blade should be replaced.

The Torpedo

The cylindrical piece of metal which is flush riveted to the bottom of the blade is the torpedo. It is tapered to a point in front and has the plug (sometimes called the expander) attached to the rear end.

Not only is the torpedo tapered at the front, but it is given "lead" as is a plough share so that it will draw the mole plough into the ground.

The pressure exerted by the soil on the lead and the length of the torpedo and plug hold the mole plough in the ground. If wear on the tip of the torpedo has removed the lead, it will be difficult to get the mole plough to enter the ground. Before this stage is reached the lead should be renewed or the torpedo replaced.

The Plug

The plug expands, forms, and packs the mole channel and should therefore increase slightly in diameter from front to rear. It should be attached to the torpedo by flush riveting the tongue of the plug into the slot of the torpedo.

Nuts and bolts must not be used, as they extend beyond the diameter of the plug and tear the sides of the channel being formed. Plugs should be plain. Plugs fitted with fins for re-opening the blade slit closed by the passage of the plug seldom track perfectly, and as a result the fin only cuts another slit beside the original.

The $2\frac{1}{2}$ in. diameter plug is probably close to the ideal, but the size of plug depends on the power available. If enough power is available to pull a 3 in. plug, use a plug of this size, as

it will take longer for it to wear down to, say, $2\frac{1}{4}$ in. before renewal than it will for a $2\frac{1}{2}$ in. plug to wear to $1\frac{3}{4}$ in.

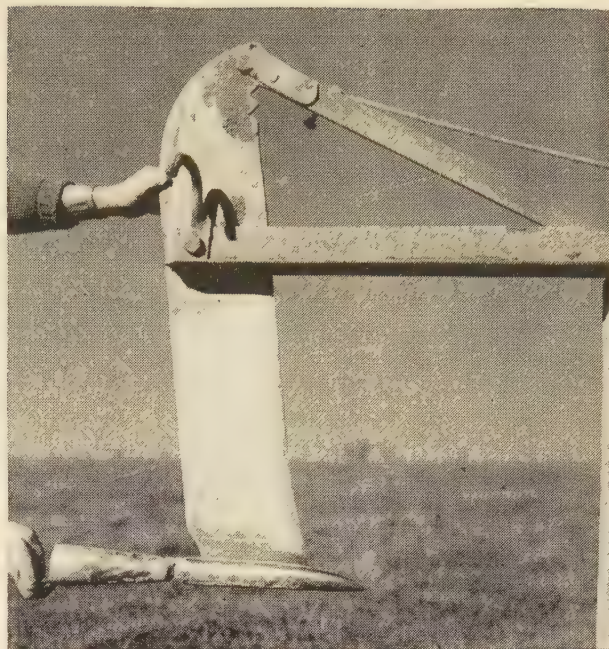
Plugs of greater diameter than 3 in. should not be used, as they have to be pulled at greater depths to ensure that the channel is being formed in good clay and this is usually beyond the ability of most tractors available.

When the mole plough is working, the beam, torpedo, and plug should all travel parallel to the ground surface to form a round channel and reduce the draught to a minimum.

If the torpedo and plug travel other than in this position, they will form a poor channel, which cannot be expected to last as long as a good channel.

The action of a mole plough is to form a channel in the soil which will resist the eroding action of water passing along it and to make a blade slit from which radiate for up to 3 ft each side fine cracks in the form of a herringbone.

These fine cracks and the blade slit allow the movement of water from the saturated topsoil, in which it is held as a perched water table, to the mole channel, which conducts it to an outlet, and this explains why the best results are obtained from pulling mole drains at about 6 ft intervals.



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"SHEP"

Sodium Chloride as a Partial Substitute for Potassium Chloride in Pasture Topdressing

By J. KARLOVSKY,
Scientific Officer, Department of Agriculture, Hamilton

DURING the past 50 years extensive experiments have been carried out with salts of sodium to determine their role in plant nutrition and value for increasing crop yields. Despite this, however, the function of sodium in the metabolism of plants is still controversial. Indications are that for plants such as turnips, beets, and mangels sodium is essential, having some special functions that only it can fulfil. On the other hand, many plants do not require sodium for their normal growth if the supply of potassium is adequate. If, however, the soil is potassium deficient, the addition of sodium not only increases yields, but also the percentage of potassium in the plant.

SINCE many New Zealand soils are known to be inadequately supplied with potassium, the possibility of substituting sodium for part of the potassium requirements has been investigated on potassium-deficient Horotiu sandy loam at the Department of Agriculture's Rukuhia Soil Research Station.

A mowing trial with four replications was laid down in autumn 1954 on a ryegrass-white clover pasture showing symptoms of potassium deficiency. The trial area was in permanent pasture from 1950 onward and was grazed rotationally by sheep until the trial was started. The pasture production was measured from autumn 1954 to winter 1958 by 52 cuts. The treatments were applied annually in autumn and all clippings were returned to the plots.

Effects of Sodium Chloride and Potassium Chloride on Pasture Production

The treatments and the relative pasture yields (annual and total) are given in the following table:

Treatments	Pasture yields relative to control (100)				Total for four years
	1954-55	1955-56	1956-57	1957-58	
1. 1 cwt of sodium chloride ..	113*	113*	109	104	109
2. 2 cwt of sodium chloride ..	115†	121†	110	108	113*
3. ½ cwt of sodium chloride + ½ cwt of potassium chloride	112*	124†	121†	121†	120†
4. 1½ cwt of sodium chloride + ½ cwt of potassium chloride	119†	131†	127†	131†	127†
5. 1 cwt of potassium chloride	117†	136†	137†	134†	132†
6. 1 cwt of sodium chloride + 1 cwt of potassium chloride	122†	148†	145†	147†	141†
7. ½ cwt of sodium chloride + 1½ cwt of potassium chloride	121†	150†	149†	144†	141†
8. 2 cwt of potassium chloride	130†	155†	156†	154†	149†

* Difference from control significant at 5 per cent
† Difference from control significant at 1 per cent

For the first two years both 1 and 2 cwt of sodium chloride in the absence of potassium chloride increased pasture production significantly, but in the next two years the responses were much smaller. In the first year 1 cwt of sodium chloride gave a 13 per cent yield increase and 2 cwt 15 per cent increase compared with 17 per cent for 1 cwt of potassium chloride and 30 per cent for 2 cwt. In the final year, however, the sodium chloride responses had fallen to only 4 per cent and 8 per cent for 1 and 2 cwt respectively, whereas the potassium chloride responses had increased to 34 per cent and 54 per cent respectively. This indicates that the effect of sodium chloride on potassium-deficient pastures is transient and that sodium can replace potassium to a limited extent only.

Sodium chloride applied in combination with potassium chloride gave quite consistent though not significant increases in yield in all years. Over the four years treatment 4 showed higher yields than treatment 3 (127 against 120). Similarly treatment 6 (141) outyielded treatment 5 (132).

The results show that from an economic point of view the use of sodium chloride on pastures can be recommended only for one or two seasons and if it is priced much below potassium chloride. Limited supplies

(several thousand tons annually) of this material, commonly called agricultural salt, can be obtained from freezing works for about £4 per ton. Nevertheless even this cheap material should be used cautiously as a substitute for part of the potassium chloride rather than on its own.

Effect of Sodium Chloride on Botanical Composition of Pasture

Sodium chloride increased the amount of white clover during summer, but not as much as potassium chloride. In winter better grass growth was observed on the sodium chloride plots than on potassium chloride and non-treated plots.

Effect of Sodium Chloride on Soil Tests

The initial soil test showed considerable plot-to-plot variations in potassium level. This was undoubtedly due to the sampling of urine patches. However, samples taken four months after the first topdressing and later during the trial gave very consistent potassium figures ranging from 2.5 to 3 units on control and rising slightly with increasing rates of potassium chloride.

Three sets of soil samples, taken between the first and second topdressings, showed a slight but quite consistent rise in potassium soil test status due to the application of sodium chloride (one reaching significance). After the second and subsequent topdressings the effect of sodium chloride was not detectable, suggesting that sodium replaced and released potassium in the soil complex in the initial stages of the experiment.

The addition of sodium chloride significantly increased the exchangeable soil sodium content, but had no effect on pH, phosphate, and calcium soil status.

Effect of Sodium Chloride on Chemical Composition of Pasture

Mixed herbage and also separate clover and grass samples were analysed from several cuts. The absorption of sodium by pasture plants on non-treated plots was high. The topdressing with sodium chloride did not appreciably increase sodium uptake in summer; however, in winter it was increased significantly. The addition of potassium chloride to sodium chloride resulted in a drastic reduction in sodium uptake.

The applications of sodium chloride raised the potassium content in both clovers and grasses in 1954 and 1955, but cuts taken in 1957 and 1958 showed no higher potassium uptake. This is in agreement with both pasture responses and soil test results, and indicates also that sodium can release only a limited amount of potassium.

Conclusions

● Responses to sodium chloride applied annually at 1 or 2 cwt per acre to pastures on Horotiu silt loam are much smaller than those obtained with the same rates of potassium chloride.

● As a complete substitute for potassium chloride at 1 or 2 cwt rates, sodium chloride is effective for about two applications. If used as a partial substitute for potassium chloride, its effect is smaller initially, but continues for more applications.

● Its use can be recommended only on potassium-deficient pastures if it can be obtained at a very low price. Even then it should be used as a supplement to, rather than a substitute for, potassium chloride.

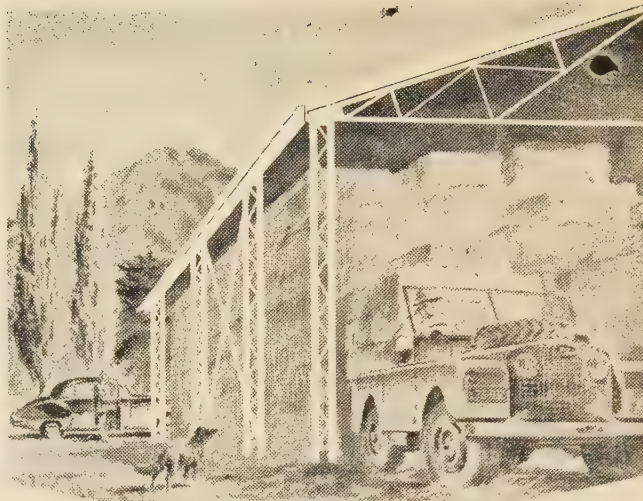


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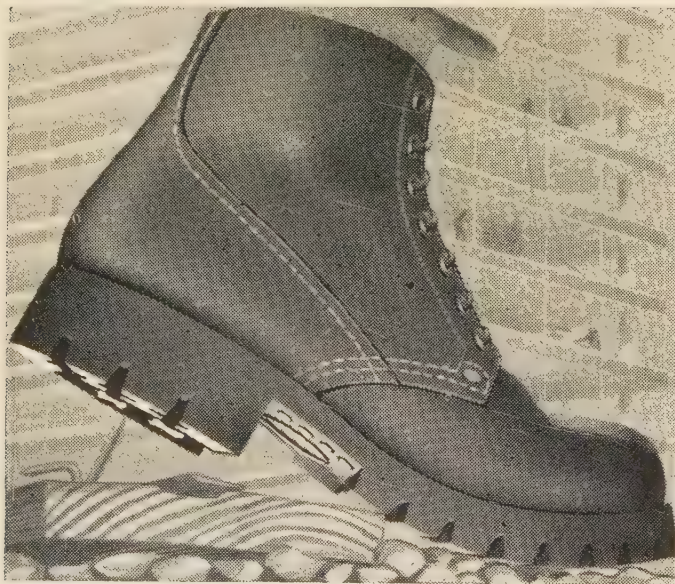
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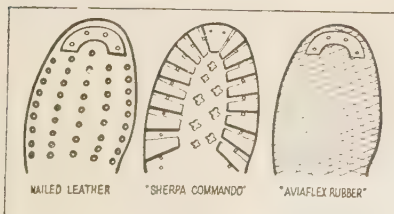
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What Do Sheep Eat on Tussock Grassland?

By J. M. HERCUS,

Farm Advisory Officer (Agrostology), Department of Agriculture,
Christchurch

REVEREGATION of much of the depleted tussock country of the South Island has become possible with attainment of control of the rabbit. With present numbers and management of the grazing animals, some plant regeneration is taking place, but the process is slow. In the hope that it could be speeded up and directed along the most useful, productive lines, much field work has been undertaken to find out what plant species are preferred by animals grazing this country and what adaptations of management would be desirable and practical. This article describes one of the studies concerned with sheep grazing habits and it is to be followed by others dealing with a different approach to the same question and with some of the influences of grazing management.

OPINION on what sheep eat on tussock grassland ranges from eating everything and anything to a diet of "fresh air and scenery", and there probably are circumstances in which both these extremes apply. However, it is recognised that sheep can and do select particular species, and sometimes particular parts of these plants. Some species are known to be consistently grazed, others only at certain times, stages of growth, or on particular aspects, but on tussock grassland in particular there is a large number whose palatability is either not known or the evidence about which is contradictory.

When it is considered that over 250 plant species have been recorded in our 11 million acres of tussock grassland, this lack of information is hardly surprising. It is not unusual to find 50 or more species on any one hill slope or valley floor, and on most blocks or paddocks the animals can select from among at least this number.

On any site the species present can be grouped into some order of abundance; some plants are numerous, some only occasionally found, and others are rare. Certain species are well distributed over the whole area and others tend to occur only on a particular soil, slope, or aspect. These characters of abundance and distribution add to the difficulties of assessing palatability.

General view of the hill country →
area in which the trials were carried
out. This shows the intermediate,
dark, and unsown faces.

Identifying Most Abundant Palatable Species

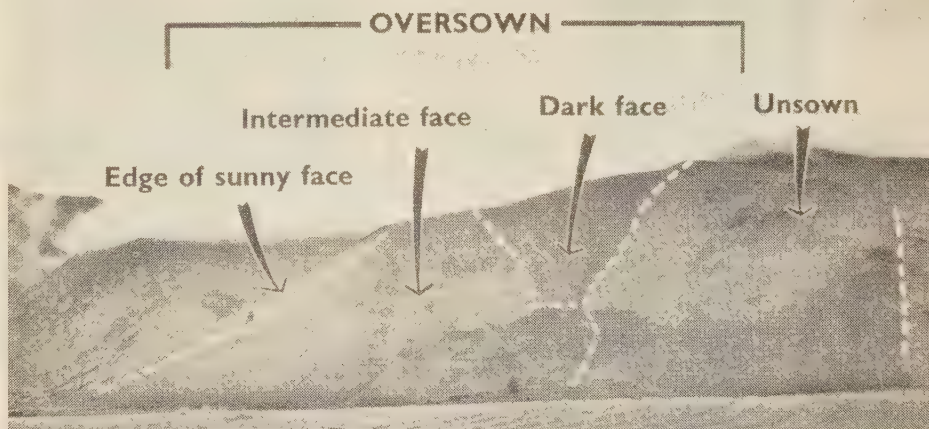
It was considered that an important preliminary to improving both the plant cover and the yield of animal products would be to identify the most abundant palatable species. If this was followed up with a study of their requirements for optimum growth and reproduction, a system of grazing management could be devised to favour them, if possible at the expense of the less desirable species. The aim of this approach is to see if the grazing times and intensities can be manipulated to encourage the better plants, as distinct from the present policy, which requires the vegetation to fit into a rigid pattern of management.

This study was conducted on the depleted country of Central Otago. Here the recent control of the rabbit had set the stage for reclothing much of the area, and if the more desirable species were known, there seemed a good chance of deliberately encouraging their spread rather than just leaving it to nature.

The detailed work was done on an 80-acre experimental block on Mr D. Kane's property near Hawea Flat. The area is part of a steep sunny face, its altitude ranging from 1,300 to 2,000 ft, and roughly two-thirds of it faces north to north-west. It is typical of a considerable area of depleted country.

In 1949 the Department of Agriculture laid down a series of grass and clover oversowing trials on half of the block. The species used were mostly of overseas origin and were chosen as a result of their performance in small plot trials in the district. In spite of a netting fence, rabbits were a serious problem until 1951, and since 1953 the block has been grazed by sheep from May-June until September each year.

By 1955 there had been little response on the steepest, most depleted faces, and a marked increase in both number and vigour of certain native grasses on the less exposed, sunny faces. Wherever there was some protection from sun and wind, and better soil, oversown grasses were providing fair to good ground cover.





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Large Number of Species Available

Though most of this experimental area faces north-west, there are two small shady faces and a sort of intermediate, west-facing portion. The sheep had some choice as to aspect, and a large number of plant species was available; 55 of them were resident species and 11 had been oversown.

In 1955, 54 ewes were grazed on the 80 acres, but because of certain practical difficulties these were replaced by hoggets during that winter, and 80 to 90 hoggets have been wintered each year since. Details of the grazing in 1955 and 1956 are:

1955

54 ewes from mid June until end of July; 10 days later, 120 hoggets until end of September.

1956

80 hoggets from early April (two months earlier than in 1955) until the end of September.

Simple Observation Unsatisfactory

Initially, simple observation of the grazing animal was tried, but even with two observers this method was found unsatisfactory except where the vegetation was sparse and short. The main problem was the animals' lack of appreciation of human company, but even when undisturbed the sheep were constantly on the move. It appeared that the animals grazed in groups, each group covering a certain altitude zone, and throughout the day the members of each group made at least three complete traverses of their zone from boundary fence to boundary fence. The hoggets moved about more quickly than the ewes, but both followed a similar pattern of behaviour. It is not known whether the same animals remained in each group or whether the same group remained in the same general altitudinal zone.

Sampling with Wire Ring

The method finally evolved was sampling with a 1 ft diameter wire ring. This was thrown down at random over the whole of the particular aspect or plant community being examined, and at each throw the species inside the ring were recorded and each was rated according to its degree of defoliation.

The purpose was simply to identify the abundant palatable species, and it was decided that plants present in 10 per cent or more of the total samples on any aspect or vegetation type were the ones to consider. The evidence suggested that this group contributed most to the sheep's diet, and in any case this is the group within which changes in grazing management are most likely to have rapid worthwhile results.

WHAT DO SHEEP EAT ON TUSsock GRASSLAND?



The sunny face on the oversown portion of the block. The sheep spent most of the winter on this.

On the sunny face 47 species were recorded, but only 14 of these were present in 10 per cent or more of the total samples. Eight of these 14 were found to be consistently grazed, six of them were resident species, and two were oversown in 1949.

On the intermediate face, with a westerly aspect, 42 species were present in the samples, but only 12 of these met the definition of reasonably abundant. Eight of the 12 were regularly grazed over the winter, five of

them were residents, and three were oversown.

On the small area of dark face 42 species were recorded; 11 were in 10 per cent or more of the samples, but only four were described as consistently grazed. Three of the four had been oversown in 1949.

Regularly Grazed Species

In the block as a whole 21 species were present in 10 per cent or more of the 200 odd samples taken on each occasion, and of these, 12 were described as regularly grazed. These 12 were *Danthonia buchanani*, *D. pilosa*, *Agropyron scabrum* (blue wheat grass), *Crepis capillaris* (hawk weed), *Carex* spp., *Rumex acetosella* (sorrel), *Vulpia dertonensis* (hair grass), *Arrhenatherum elatius* (tall oat grass), *Dactylis glomerata* (cocksfoot), *Achillea millefolium* (yarrow), *Holcus lanatus* (Yorkshire fog), and *Anthoxanthum odoratum* (sweet vernal). Of these, the *Danthonia pilosa*, tall oat grass, cocksfoot, yarrow, Yorkshire fog, and sweet vernal had been oversown.

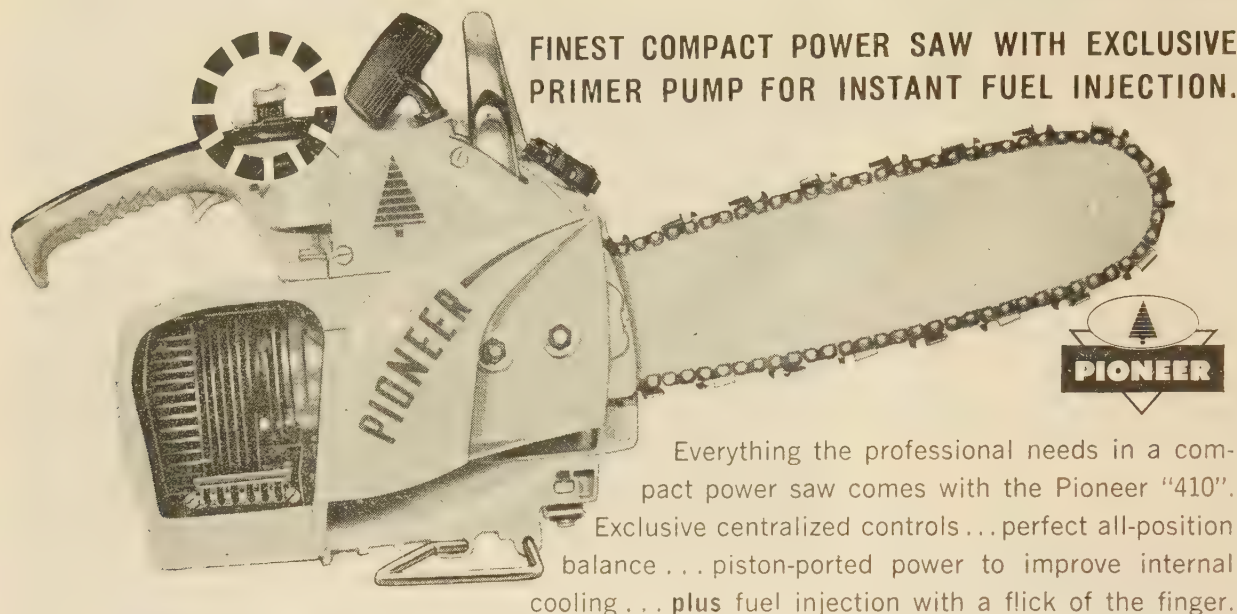
Within this group of preferred species, the study indicated there were different times of grazing over late autumn, winter, and early spring. For example, tall oat grass was eaten in autumn and mainly on the sunny aspects; the two species of *danthonia* and blue wheat grass appeared to provide most of the feed in June, July, and into August; cocksfoot was grazed



The 1 ft diameter ring used to identify the abundant palatable species. The ring is thrown down at random over the section being examined and the species inside the ring are recorded and the amount of defoliation estimated.

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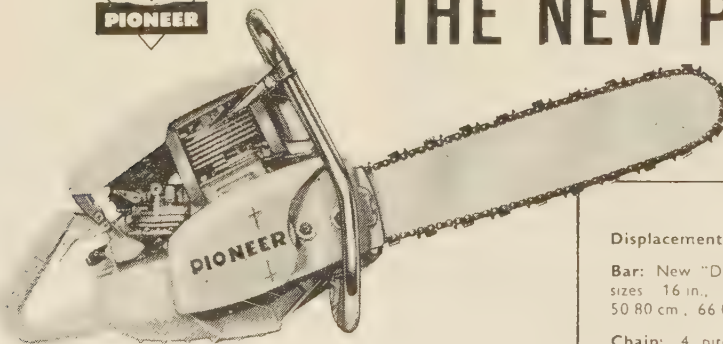
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on all aspects and further into winter than was tall oat grass; with an autumn and winter germination of hawk weed and hair grass on warm aspects these species seemed to bear the brunt of the late winter-early spring grazing pressure.

During two winter grazings *Poa colensoi* (blue tussock) and *Festuca novae-zelandiae* (hard tussock) were found to be virtually ignored.

These results were obtained from fortnightly sampling during the 1955 grazing period and were confirmed by the two samplings taken in 1956, one in July and the other in October. Two other winter-grazed blocks in Central Otago were examined in 1956, and for the plant associations common to all areas the results were similar.

This study was only the first step and with some leads as to what plants were preferred by the sheep it was intended to try to measure the contribution of each species to the diet. So far, it has not been possible to develop this second stage very far. However, on Mr Kane's block of winter country, where the animals could select their diet from among a range of resident and oversown grasses, observation alone was sufficient to show that most of the wintering was done on resident native species, with a very small contribution from oversown grasses. This appeared to apply to both ewes and hoggets.

Oversowing and Topdressing

Clovers had been oversown on several small manurial trials in 1949, but they failed to survive and until 1959 the grazing studies on Mr Kane's area were on a vegetation devoid of pasture legumes.

In the winter of 1958 the lower half of the block was aerially oversown and topdressed, with good results on the shady and semi-shady aspects but with poor establishment on the depleted sunny faces, as one might expect. Observation suggests that from soon after the onset of winter frosts until October, and probably until well into December if the sheep are kept on this hill country, grazing pressure is concentrated on to the sunny faces and on to a small number of native grass species, no matter what quantity or quality of clovers and improved grass species is available on the adjoining shady aspects.

With or without the aid of oversowing and topdressing, the improvement of both cover and production depends on grazing management—number and kind of animals and length of grazing period—and this applies particularly to the depleted winter country of Central Otago. It is intended to discuss some observations and experiences and grazing management in a subsequent article.

RADIO broadcasts for farmers will be given during August as follows:

1XH Hamilton, 12.33 p.m.

14 August—"Prepare Your Land for Crops", by J. R. Murray, Farm Advisory Officer, Department of Agriculture, Hamilton.

21 August—"King Country Farming", by N. Davidson, Federated Farmers, Hamilton.

28 August—"Dairy Cows Versus Fat Lambs", by J. M. Miller, Farm Economist, Department of Agriculture, Hamilton.

2XG Gisborne, 8 p.m.

1 August—"Sheep and Wool Activities", by R. W. Scaife, Sheep and Wool Instructor, Department of Agriculture, Gisborne.

8 August—"For the Orchardist", by J. Overby, Horticultural Instructor, Department of Agriculture, Gisborne.

15 August—"Stockowners' Question Time", by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

22 August—"Practical Hints for Poultry Keepers", by H. K. Mullins, Poultry Instructor, Department of Agriculture, Hastings.

29 August—Gisborne Veterinary Club.

1YZ Rotorua, 7.15 p.m.

2 August—"For the Market Gardener", by B. M. Piper, Horticultural Instructor, Department of Agriculture, Tauranga.

16 August—"Spring Pasture Management of Dairy Pastures", by A. V. Allo, Farm Advisory Officer, Department of Agriculture, Tauranga.

30 August—"Docking of Lambs", by A. G. W. Stevens, Livestock Instructor, Department of Agriculture, Rotorua.

2XP New Plymouth, 8 p.m.

3 August—"News and Views from the Farm Advisory Division", by C. Christie, Farm Advisory Officer, Department of Agriculture, Stratford, Peter Weenink's Y.F.C. Session.

17 August—"Hormones in the Home Garden", by J. B. Laurenson, Plant Quarantine Officer, Department of Agriculture, New Plymouth.

24 August—"Radio Vet.", by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

2XA Wanganui, 8 p.m.

3 August—"For the Countrywomen", by Mary Macdonald.

10 August—"Farming News".

17 August—"Livestock Notes", by J. F. Munting, Livestock Instructor, Department of Agriculture, Wanganui.

24 August—"Sheep and Wool Field Notes", by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui.

31 August—"Sprays and Spraying for Horticulture Crops", by G. N. Paulin, Horticultural Instructor, Department of Agriculture, Wanganui.

2XB Masterton, 6.45 p.m.

11 August—"Livestock Notes", by G. F. Hudson, Livestock Instructor, Department of Agriculture, Masterton.

3YA Christchurch, 12.20 p.m.

7 August—"Spring Control of Orchard Pests and Diseases", by L. C. Hurdell, Horticultural Instructor, Department of Agriculture, Christchurch.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

7 August—"Feeding the Ewe Flock", by C. A. Martin, Livestock Instructor, Department of Agriculture, Dunedin.

14 August—"The Drainage of Peat Soils in Southland", by I. R. Falconer, Fields Instructor, Department of Agriculture, Invercargill.

21 August—"Correcting Wool Faults", by W. F. Dick, Sheep and Wool Instructor, Department of Agriculture, Invercargill.

28 August—"Feeding for Milk Production", by R. K. Darwin, Farm Advisory Officer, Department of Agriculture, Dunedin.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 12.33 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report", followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays, 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer") and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XB Masterton, Fridays at 6.45 p.m. ("Farm Session").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest"), and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer"), and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service"), and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays, Wednesdays, and Thursdays at 12.33 p.m.

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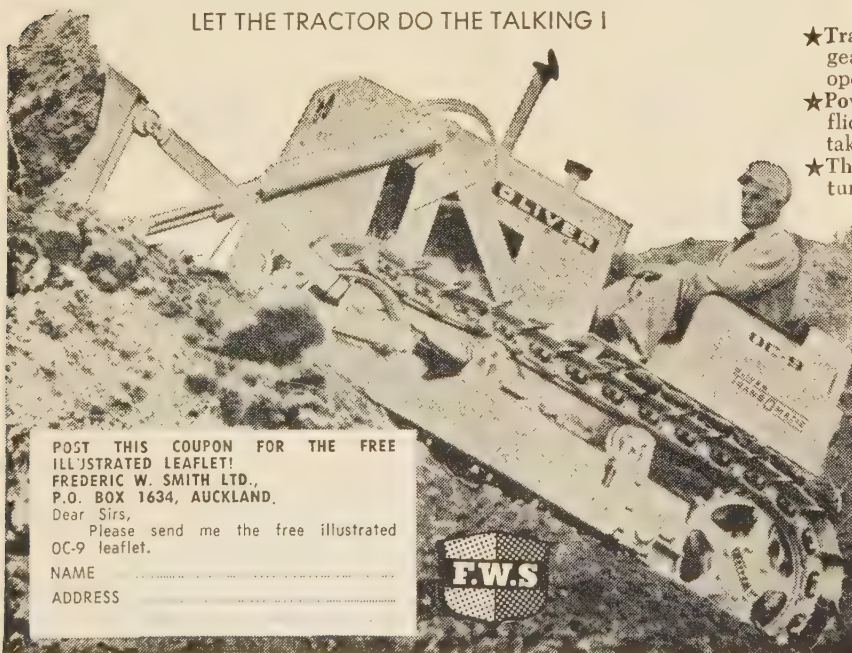
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In the list below the figures after each supplier's name and address are the number of animals tested and these are followed by the date of the test.

These herds will be recorded in the New Zealand Register of Clear Herds, compiled by the Department of Agriculture.

ADAMS, E. J., Coatesville, 3 R.D., Albany, 86, 14/4/61
 ANDERSON, G. J., Post Office, Stirling, 71, 1/3/61
 ANDERSON, R. G., P.O. Box 19, Stirling, 102, 25/2/61
 ANDREWS, A. H., Brook St., Nelson, 53, 28/3/61
 ASHBY, N. L., 65 Turners Rd., Belfast, 34, 27/3/61
 AUBREY, A. H., 5 R.D., Whangarei, 90, 11/4/61
 BAILEY BROS., Karaka, 1 R.D., Papakura, 106, 14/3/61
 BAIRD, A. R., Aparima, 41, 17/4/61
 BARNES, R., 180 Johns Rd., Belfast, 14, 27/3/61
 BARROW, C. H., Maharahara R.D., Dannevirke, 67, 18/4/61
 BEALE, R., Ormond St., Woodville, 8, 19/4/61
 BELL, R. A., Bell's Rd., Pakuranga, 121, 20/3/61
 BELL, W. R., c/o Post Office, Stirling, 52, 20/3/61
 BENNETT, W. W., 34 Burnham St., Seatoun, Wellington, 56, 21/3/61
 BEVIN, W. J. E., Orepuki, 28, 18/4/61
 BILLS, B. R., Box 57, Convent Road, Otaki, 44, 20/4/61
 BOND, Mrs E., Whiteman's Valley, Upper Hutt, 84, 28/3/61
 BOOTH, D. C., Aparima No. 1 R.D., 44, 17/4/61
 BOSS, K. H., 1 R.D., Tokoroa, 66, 7/3/61
 BOWLER, K., Main Rd., Kaitoke, 100, 24/4/61
 BOWLING, J., Box 7, Main Rd., Ohau, 44, 18/4/61
 BROWN, D., "Silverbirch", North Rd., Kalapoi, 36, 28/3/61
 BROWN, F. R., Papatotara-Tuatapere R.D., Papatotara, 48, 18/4/61
 BROWN, K. C., Tirau Road, Hinuera, Matamata, 110, 28/3/61
 BROWN, W. L., 103 Turners Rd., Belfast, 47, 27/3/61
 BRYANT, A. F., 2 R.D., Arapaepae Rd., Levin, 42, 24/4/61
 BRYANT, R. D., Box 933, Hamilton, 77, 20/4/61
 BUHLER, J. F., 237 Glover Rd., Hawera, 75, 28/3/61
 CALSAR, R. G., 6 Glovers Rd., Halswell, 27, 17/4/61
 CAMERON, N., Westney Rd., Mangere, 101, 7/3/61
 CAMPBELL, N. M., Box 24, Otaki Railway, 192, 17/4/61
 CASE, W. L., 170 Gardiners Rd., Christchurch, 26, 28/3/61
 CASELEY, E. F., Brunswick Rd., Wanganui, 78, 20/3/61
 CHARLES, E. G., Karaka, 1 R.D., Papakura, 182, 29/3/61
 CLARIDGE BROS., 186 Sawyers Arms Rd., Christchurch, 63, 24/3/61
 CLOUSTON, J. D., Aparima, 85, 17/4/61
 COCKRELL, F. H., Foxton Rd., Levin, 60, 10/4/61
 CODLIN ESTATE, c/o Public Trust Office, Dannevirke, 109, 12/4/61
 COLLIE, O. E., Kaitoke, 30, 24/4/61
 CONVENT OF THE GOOD SHEPHERD, P.O. Box 50, Te Horo, 26, 24/4/61
 COOK, G. S., Kaitoke, Hokitika, 36, 25/3/61
 COOPER, A. L., 1 R.D., Hamilton, 110, 20/4/61
 COTTLE, H. S., Maoribank, Upper Hutt, 74, 24/3/61
 COUGHEY, L. C., R.D., Patumahoe, 72, 10/4/61
 CRAWFORD BROS., Kopu, Thames, 216, 7/3/61
 CROWLEY, C., Kukuia R.D., Wanganui, 218, 27/3/61
 CROZIER, S. C., Henley, 1 R.D., Outram, 48, 21/3/61
 DALZIEL, J., Makakipawa, Blenheim, 62, 23/3/61
 DANIEL, G. R., Block Rd., Murupara, 81, 19/4/61
 DAWSON, P. M., Smales Rd., East Tamaki, 162, 6/3/61
 DEAN, F. B., 4 Grimseys Rd., Christchurch, 6, 7/4/61
 DEATH BROS., Pauatahanui, 128, 6/3/61
 DE SIMAS, J. F., Box 42, Manakau, 97, 24/4/61
 DICKENS, R. E., Quarry Rd., Brookby, 50, 11/4/61
 DORSET, Mrs C. A., Box 16, Manakau, 50, 31/3/61
 DUNSTAN HOSPITAL, P.O. Box 30, Clyde, 4, 21/3/61
 EDEN, G. M., Spring Grove, Wakefield, 47, 24/3/61
 EGERTON, J., P.O., Tuatapere, 14, 18/4/61
 ERNST, Mrs B. D., Nine Mile Rd., Greymouth, 6, 24/2/61
 FAIRBROTHER ESTATE, c/o Public Trust Office, Dannevirke, 131, 18/4/61
 FAITH, A. J., Main Rd., Te Horo, 107, 28/3/61
 FLEMING, T. H. R., Otokia, 1 R.D., Outram, 28, 21/3/61
 FLETT, J. G., Aparima R.D., 76, 17/4/61
 FORD, B. H., Appleby, R.D., Richmond, 71, 25/3/61
 GARDINER, P. F., Rangiora Rd., Reikorangi, 35, 9/4/61
 GOVAN, G. T. A., 3 R.D., Alexandra, 72, 3/3/61
 HALL, R. H., Bay Rd., Invercargill, 106, 10/4/61
 HALSEY-MAHONEY, Mrs S., Kapiti Rd., Paraparamu, 125, 11/4/61
 HARPER, N., R.D., Hikutaia, 104, 28/3/61
 HART, S. J., Darfield R.D., 16, 17/4/61
 HARVEY, A. P., Whakamaru, R.D., Mangakino, 105, 27/3/61
 HARVEY BROS., Main North Rd., Kalapoi, 67, 23/3/61
 HEWITT, J., Estate of, 6 R.D., Keruru Rd., Koputaroa, Levin, 123, 24/4/61
 HEWLETT, A. A., LTD., Barrytown, 56, 24/2/61
 HOGGARD, J. D., Kaitoke, 97, 13/3/61
 HOOK, W. T., Beach Rd., Makara, 23, 10/4/61
 HOPKINSON, F. M., Turiwiri, Dargaville, 130, 27/3/61
 HUNT, W. G., Otokia, 1 R.D., Outram, 59, 13/3/61
 JAMES, H. J., Box 5, Kamo, 77, 10/4/61
 JAMES, J. J., Queen St., Richmond, 36, 24/3/61
 JEPSON, J. M., East Rd., Kuku, Ohau, 63, 24/4/61
 JEPSON, W., Forest Lakes Rd., Box 42, Otaki Railway, 95, 30/3/61
 JONES L. and B., West Oxford, 35, 10/4/61
 JORDAN, Miss R., Clifton, 19, 3/4/61
 JURY, R. J., Maungatua, 1 R.D., Outram, 100, 28/3/61
 KAY BROS., Onawe, Duvauchelle, 94, 18/4/61
 KING, J. A., Paretai, 1 R.D., Balclutha, 144, 14/3/61
 LANDS and SURVEY, Whareroa Block, P.O. Box 5002, Wellington, 151, 17/4/61
 LANE, D. C., Main Road, Tokoroa, 157, 10/4/61
 LILLY, E. G., 1 R.D., Tokoroa, 110, 7/3/61
 LUNN, Mrs M., Hamner, 14, 23/3/61
 MacDONALD, K., Rototuna, 1 R.D., Hamilton, 83, 7/4/61
 McELDOWNNEY, J. N., Wortley Rd., Lepperton, 73, 17/4/61
 McFADDEN, C. J., 82 Johns Rd., Belfast, 138, 14/4/61
 McGUIRE, J. P., 32 Hanrahan St., Riccarton, Christchurch, 62, 3/4/61
 MacKAY, W. J., 22 Mairehau Rd., Burwood, 30, 28/3/61
 McKEE, P. E., P.O. Box 3, Stirling, 76, 20/3/61
 McKELLAR, O. L., P.O. Box 6, Alexandra, 20, 11/3/61
 McLAREN, E. M., Henley, 1 R.D., Outram, 118, 13/3/61
 McLAREN, J. E., Clifton, 2 R.D., Hastings, 89, 23/3/61
 McLEAN, L. H., R.D., Hira, Nelson, 32, 25/3/61
 McLEOD, P. J., Wallace Rd., Levin, 68, 27/3/61
 MacMILLAN, J. A. G., Aorangi Rd., 6 R.D., Feilding, 77, 10/4/61
 McRAE, E. J., Otautau, 13, 17/4/61
 MARSHALL, A., Paretai, 1 R.D., Balclutha, 55, 22/2/61
 MARSHALL, J., Paretai, 1 R.D., Balclutha, 141, 22/2/61
 MARSHALL, W., Paretai, 1 R.D., Balclutha, 141, 3/3/61
 MARTIN, C. N., Pareremo, Albany, 71, 18/3/61
 MASSEY, I. F., Buckland Rd., Mangere East, 158, 18/4/61
 MAXWELL, F. H., Hogs Rd., Ohau, 108, 10/4/61
 MINGINS, D. G., No. 3 Line, Wanganui, 71, 20/3/61
 MONK, L. E., Te Manuao Rd., Otaki, 78, 10/4/61
 MOORE, R. S., Jacksons Rd., Ohoka, 46, 23/3/61
 MORRIS, G. J., Hinuera, Matamata, 90, 28/3/61
 MORRISON, R. J., c/o Post Office, Stirling, 27, 14/3/61
 MUIR, J., Galloway, R.D., Alexandra, 80, 3/3/61
 MULHERN, R. C., Pukerua Bay, 54, 3/3/61
 MURPHY BROS., 153 Junction Rd., Halswell, 100, 20/3/61
 MURRAY, H., Muhunua West Rd., Ohau, 92, 8/4/61
 NARAN, G. and SON, Te Marua, Upper Hutt, 13, 14/4/61
 NELSON, E., P.O. Box 38, Omakau, 24, 7/3/61
 NELSON MENTAL HOSPITAL, Waimea Rd., Nelson, 19, 25/3/61
 NEWPORT, A. M. J., Beach Rd., Papakura, 68, 3/4/61
 NGAWHATU MENTAL HOSPITAL, Ngawhatu, P.O., Nelson, 157, 6/4/61
 NICKOLSON, D. B., R.D., Albany, 55, 17/4/61
 NUTTALL, N., Riverton-Tuatapere, R.D., Riverton, 113, 18/4/61
 OATES, W. H., Tirau Rd., Hinuera, 142, 28/3/61
 OLIVER, A. D., Hororata, R.D., 63, 17/4/61
 PARCELL, B. C., P.O. Box 8, Bannockburn, 33, 31/3/61
 PATRICK, S. K., West Oxford, 41, 10/4/61
 PAUATAHANUI FARMS LTD., 29 Golders St., Upper Hutt, 105, 15/3/61
 PHELAN, A. T., Maharahara, R.D., Dannevirke, 48, 18/4/61
 POLGLASE, N. E., Hill St., Richmond, 61, 17/4/61
 POULSEN, M. J., 360 Johns Rd., Harewood, 17, 20/3/61
 POWELL, C. H., West Plains, 80, 14/4/61
 PRICE, R. P., Maoribank, Upper Hutt, 101, 27/3/61

(Continued at foot of page 80)

Pressure on Road Fences is from Paddock

PRESENT-day road fences will need less maintenance if posts are on the road side of the wires, opposite to the way in the early days, when posts were on the paddock side.

WHEN all stock were driven on foot road verges were usually kept closely grazed and stock exerted most pressure on the fence from the road into the paddock. Posts and battens on the paddock side of the wires took the strain rather than the staples in them. This meant less maintenance both in re-stapling and straightening battens and in re-straining wires. Posts also had a longer life because cattle could not rub against them.

With practically all stock now being transported by truck stock in paddocks are tempted to push their heads through fences to get at surplus feed on the roadside, and the thrust is from the paddock toward the road.

Many fences now being built have posts and battens on the road side of the wires.

—A. A. DUNCAN,

*Farm Advisory Officer,
Department of Agriculture,
Wanganui*



A fence with posts and battens on the road side of the wires.

Town Supply Herds

(Continued from page 79)

QUEEN MARY HOSPITAL, Hanmer, 74, 26/3/61
 REID, Mrs L. G., R.D., Runciman, 126, 21/3/61
 REYLAND, B. W., Cameron Rd., Westmere, 79, 18/4/61
 RICHARDS FARM LTD., 165 Turners Rd., Belfast, 54, 12/4/61
 ROACH, G., Spring Creek, Blenheim, 11, 23/3/61
 ROBB, D. A., No. 3 Line, Wanganui, 120, 6/4/61
 ROBB, G. A., No. 3 Line, Wanganui, 75, 6/4/61
 ROBERTSON, H. T., Takapu Rd., Tawa, 5, 21/4/61
 ROSS, D. G., Henley, 1 R.D., Outram, 57, 3/3/61
 RUSSELL, K., 1 R.D., Mosgiel, 59, 23/3/61
 RYAN, R. J. and J. M., Box 15, Kerepehi, 56, 23/2/61
 RYAN, T. J., Sealy Rd., Omata, 115, 6/3/61
 ST. PATRICK'S COLLEGE, Silverstream, 102, 4/3/61
 ST. PETERS LTD., Cambridge, 207, 28/4/61
 SANSON, G. L., 5 R.D., Feilding, 56, 10/4/61
 SAUNDERS, A. M., Waikite Valley, 1 R.D., Rotorua, 130, 21/3/61
 SCAIFE, A., R.D., Soldiers Rd., Paraparaumu, 68, 10/4/61
 SCHOLES, Mrs F. E., Mangaroa, 6, 17/4/61
 SCHOLES, L., c/o C. W. August, Mangaroa, 53, 20/3/61
 SEYMOUR, C., Ohau West Rd., Ohau, 23, 10/4/61
 SIM BROS., Karaka, 1 R.D., Papakura, 91, 15/4/61
 SIMCOX, J. W., Forest Lakes Rd., Box 23, Otaki Railway, 115, 7/4/61
 SIMMONDS, W., Te Onepu, Otane, R.D., 58, 27/3/61
 SIMPSON, D. J., Mountain Rd., Inglewood, 157, 6/3/61
 SINCLAIR, D. T., Waikuku, Kaiapoi, R.D., 14, 17/4/61
 SMYTHE BROS., Great South Rd., Manurewa, 151, 13/3/61
 SORENSON, G. B., Brixton, Waitara, 129, 21/2/61
 SOULSBY, F., Mill Farm, Annat, 72, 17/4/61
 STEWART, K. J., Lincoln, 2 R.D., Christchurch, 59, 15/4/61
 STEWART, W. A., 20 Wortley Rd., Lepperton, 125, 6/3/61
 STICK, C. W., Colac Bay, 31, 18/4/61
 STORER, A. H., P.O. Box 47, Stirling, 78, 13/3/61
 STORER, W. G., Kaitangata, via Balclutha, 70, 16/3/61

SUNNYSIDE MENTAL HOSPITAL, Templeton, Christchurch, 72, 18/4/61
 TAMATI, T., 29 Wortley Rd., Lepperton, 59, 17/4/61
 TAUNT, T. B., Beaconsfield Rd., Stratford, 72, 19/4/61
 THOMPSON, C. H., Spring Creek, Blenheim, 47, 23/3/61
 THOMPSON, Miss I. M., Pukemaori-Tuatapere, R.D., 15, 18/4/61
 TOWNLEY, A. W., Turners Rd., Belfast, 89, 13/4/61
 TULETT, L. C., 47 Hills Rd., Christchurch, 46, 13/4/61
 WAKELIN, R. P., 124 Grimseys Rd., Christchurch, 61, 28/3/61
 WALDRON, E. J., P.O. Box 33, Alexandra, 73, 14/3/61
 WALKER and SAGGERS, 2 R.D., Clevedon, 111, 11/4/61
 WARREN and SONS, Leigh, 89, 10/4/61
 WEIR BROS., c/o Post Office, Stirling, 70, 21/3/61
 WHEELER, A., and SON, Kaitangata, via Balclutha, 69, 2/3/61
 WHITCOMBE, R. G., Appleby Rd., Drury, 40, 21/3/61
 WHITE, J. A., Paretai, 1 R.D., Balclutha, 155, 3/3/61
 WHITEMAN, C., Maoribank, Upper Hutt, 98, 11/4/61
 WHITEMAN, F., Estate of, Box 17, Upper Hutt, 100, 11/4/61
 WILLIAMS, M. H., 457 North Rd., Belfast, 51, 20/3/61
 WILLOMEE FARMS LTD., R.D. Richmond, 91, 25/3/61
 WILSON, H. W., Jun., Henley, 1 R.D., Outram, 53, 11/4/61
 WILSON, T., East Rd., Clevedon, R.D., 81, 11/4/61
 WILSON, W. J. S., 1 R.D., Outram, 53, 23/3/61
 WOLFE, L. R., Cust, 55, 11/4/61
 WOODLEIGH FARM LTD., Te Ore Ore, Masterton, 173, 11/4/61
 WRATT, R. N. C., Havelock, 43, 23/3/61
 WRIGHT, C. J. C., Gladstone Rd., Levin, 73, 29/3/61
 YOUNG, R. R., 325 Somme Parade, Aramoho, 117, 27/3/61

Cancelled or Suspended Certificates

The following certificates have been cancelled or suspended:
 HERRICK, A. S., Motupipi Rd., Takaka
 LEWIS, R. L., Karaka, No. 1 R.D., Papakura
 ROGERS, W., Box 192, Ruatoria
 ROWAN, P. D., Valley Rd., Dargaville
 SCOLTOCK, G. F., Appleby, R.D., Richmond
 VICKERS, S. R., Barrett Rd., Omata

SUPERPHOSPHATE Superior to ROCK PHOSPHATES



for Pasture Topdressing

● Rock phosphates were less effective than superphosphate as fertilisers for pasture topdressing at Rukuhia.

● Direct application of Nauru rock phosphate results in waste of the mineral from which superphosphate is manufactured and which may become much less readily available to future generations.

THESE two important conclusions are listed by J. KARLOVSKY, Scientific Officer, Department of Agriculture Rukuhia Soil Research Station, among those from an experiment at Rukuhia Station in which responses from topdressing with various rock phosphates were compared with yields from superphosphate.

THE availability of phosphorus in rock phosphates from various sources has been widely tested through field experiments. In New Zealand the use of rock phosphates for direct application as fertiliser to crops and pastures became important when superphosphate production was reduced during the 1950-51 sulphur shortage. At that time the Department of Agriculture initiated many trials on different soils to test the value of types of phosphates.

In a trial on Ohaupo silt loam at Rukuhia Soil Research Station, Hamilton, several rock phosphates were compared with superphosphate on an

equal weight basis for pasture topdressing.

Previous Treatment of Area

The area on which the experiment was established had been sown down to permanent pasture in 1946 and rotationally grazed by sheep until the

start of the trial in November 1952. The initial soil test showed fairly normal levels of the major elements.

Layout and Technique

Each treatment had six replications, three on unlimed and three on limed ground, which received 5 cwt per acre of agricultural limestone annually during the trial. The technique of "mowing and clippings returned" was used and the production was measured by 45 cuts over 3½ years.

The dates of topdressing were 26 November 1952, 24 April 1953, 6 April 1954, and 7 March 1955. All fertilisers were applied at 3 cwt per acre.

The fertilisers used and their phosphoric acid (P_2O_5) contents are shown below.

Yield Results

Yield results are given in the table at the top of page 82. The overall response to superphosphate was about 10 per cent. The relatively small responses from all fertilisers, especially in the initial stages of the experiment

FERTILISERS USED AND THEIR PHOSPHORIC ACID CONTENTS

Fertilisers	Total P_2O_5	Water-soluble P_2O_5	Citric-soluble P_2O_5
North African phosphate	26.4	NH	10.7
Nauru rock phosphate	36.6	NH	8.7
Christmas Island phosphate	35.6	NH	8.0
Superphosphate	22.4	18.4	18-19

PASTURE TOPDRESSING . . .

SEASONAL AND TOTAL DRY-MATTER PRODUCTION RELATIVE TO NO PHOSPHATE (100)

Treatment	Summer	Autumn	Winter	Spring	3½ year total	Total yields lb per acre
No lime:						
No phosphate	100	100	100	100	100	26,080
N. African phosphate, 3 cwt/acre ..	111	110	112	103	108	28,180
Nauru phosphate, 3 cwt/acre ..	107	106	102	104	105	27,370
Christmas Island phosphate, 3 cwt/acre	105	106	106	105	105	27,450
Superphosphate, 3 cwt/acre	106	113	116	103	108	28,150
5 cwt lime:						
No phosphate	107	97	93	102	101	26,310
N. African phosphate 3 cwt/acre ..	118	106	101	108	109	28,420
Nauru phosphate, 3 cwt/acre ..	111	100	97	102	103	26,890
Christmas Island phosphate, 3 cwt/acre	113	102	97	103	104	27,210
Superphosphate, 3 cwt/acre	122	112	116	104	113	29,410

may be attributed to the heavy phosphatic dressings the trial area received before the establishment of this experiment, which had built up a medium to high level of phosphorus in the soil. Though the responses were small, they showed clearly the inferiority of Nauru rock and Christmas Island phosphates.

Responses to Rock Phosphates

North African phosphate yielded similarly to superphosphate on unlimed ground, but was less effective on limed ground, particularly in winter and autumn. However, in spring and summer it was slightly better than superphosphate.

Nauru rock phosphate was comparable to superphosphate only in spring and summer on unlimed soil. In winter especially and in autumn it yielded significantly lower than superphosphate.

Christmas Island phosphate gave similar results to Nauru rock phosphate.

Lime Effect

The lime effect was most pronounced in summer, when all treatments, particularly superphosphate, gave considerably higher yields on limed plots. In autumn and winter all treatments except superphosphate yielded less on limed ground. Lime did not affect the production from superphosphate in autumn, winter, and spring.

Owing to seasonal differences the overall lime effect was very small. It increased the production from superphosphate by 5 per cent and from North African phosphate by 1 per cent. On the other hand it decreased the production on plots treated with Nauru rock and Christmas Island phosphates by 2 and 1 per cent respectively.

Relative Value of Rock Phosphates

From the yield increases obtained it is possible to calculate the relative effectiveness of dressings of 3 cwt per acre of the fertilisers being compared:

The relative responses for winter were 100, 53, 15, and 26 respectively for the above fertilisers.

In two other trials (in which fertilisers were also compared on an equal weight basis) the responses from Nauru rock phosphate relative to superphosphate (100) were 56 on Hamilton clay loam and 31 on Horotiu sandy loam; those from North African phosphate were 78 on both soil types.

These figures show clearly how unavailable is the phosphorus in Nauru and Christmas Island phosphates, especially during the critical winter period, when applied directly to pastures. From other trials it has been estimated that to obtain pasture responses equal to those from 3 cwt of superphosphate at least 10 cwt of Nauru or Christmas Island phosphate would be required. As 18 cwt of superphosphate can be produced from 10 cwt of these rock phosphates, the equivalent of 15 cwt of superphosphate would be wasted in a single application of rock phosphates.

The efficacy of rock phosphates did not increase as the experiment was continued. If anything, the position of superphosphate improved slightly. This is in agreement with results from other trials on other soil types, on which the effectiveness of rock phosphates did not increase with time, even when heavy initial dressings (10 cwt per acre) of Nauru rock phosphate were compared with 3 cwt per acre of superphosphate.

Results indicate that the unavailable condition of phosphorus in rock phosphates (particularly those from Nauru and Christmas Island) applied directly to soil is permanent and that chemical

and biological reactions in the soil convert only a small proportion of the phosphorus in these fertilisers into forms which plant roots can assimilate. For this reason the use of these rock phosphates as such is very unwise, because it simply results in sheer waste of a mineral which may become less readily available to future generations.

Conclusions

- 1 Superphosphate was much more effective, particularly in winter, than any of the rock phosphates used in this trial.
- 2 North African rock phosphate was superior to Nauru and Christmas Island rock phosphate, the magnitude of the responses relative to superphosphate (100) being 80, 35, and 45 respectively.
- 3 The addition of agricultural limestone (on Ohaupo silt loam at pH 5.8) increased the summer yields of all fertilisers, particularly superphosphate. However, it had a depressing effect in autumn and winter on all plots treated with rock phosphate.
- 4 On the basis of the results obtained in this trial the direct use of Nauru and Christmas Island rock phosphates cannot be recommended because (a) it is less effective than superphosphate and (b) it results in waste of a vital commodity.



"New Zealand Garden Dictionary":

J. W. and Barbara Matthews

THIS book, an expanded edition of previous issues, is well laid out and illustrated with clear black and white photographs. It provides a quick and easy reference in alphabetical order to the great majority of plants grown in New Zealand gardens. The entries briefly describe the cultural requirements of the plants as well as the main species or varieties in cultivation here.

Some improvement could be made in future editions by including definitions of fungicides, insecticides, therapeutants, minor (or trace) elements, and similar collective terms commonly used in horticulture. The entry on pH should state that pH 7.0 is the neutral point.

—J.P.S.

A. H. and A. W. Reed. 18s. 6d.

Fertiliser	Total 3½ year dry matter yield (average limed and unlimed)		Approximate relative response
	Total lb per acre	Increase lb per acre	
No phosphate	26,170		—
Superphosphate	28,780	2,610	100
North African phosphate ..	28,330	2,160	83
Nauru phosphate	27,110	940	36
Christmas Island phosphate ..	27,310	1,140	44

Victorian Experience with Facial Eczema Disease

THERE is some evidence that in East Gippsland, Victoria, where facial eczema has occurred since 1956, high stocking rates lead to more serious outbreaks and that the disease is worse on improved permanent pastures than on topdressed native pastures. This is suggested in an article on facial eczema in the December 1960 issue of "Wool Technology and Sheep Breeding" by D. M. Flynn, Senior Veterinary Officer, Victorian Department of Agriculture.

EAST Gippsland experienced a serious outbreak of facial eczema, previously thought to occur only in New Zealand, in the autumn of 1956, and the disease reappeared in a much more serious form in 1959, when an estimated 10,000 infected sheep died in the following winter. To assist investigations in Australia an officer of the Victorian Department of Agriculture, Mr D. Hore, visited New Zealand early in 1960 to study facial eczema research.

A further outbreak of facial eczema in East Gippsland in the autumn of 1960 was not as serious as that of the

previous year, but cattle as well as sheep were affected, particularly in some irrigation areas previously regarded as relatively safe.

"... the observation ... that the disease is likely to be important in cattle, particularly those grazing on irrigation areas, raises the question as to how serious the disease is likely to become", says the report.

Different Strain of Fungus

The fungus (*Pithomyces chartarum*) which causes facial eczema has been

isolated from pasture in East Gippsland, but it appears to be of a different strain from those in New Zealand and to grow vigorously in weather and temperatures outside the range for growth under New Zealand conditions.

Trapping of spores of the fungus during the autumn of 1960 showed that it was widespread in Victoria, and since then it has been established that facial eczema of a less serious form than that experienced in East Gippsland occurs in many areas of the State.

"The limited experience which we have in Victoria has suggested that sheep allowed to run on the whole property are much less likely to suffer damage than sheep which are heavily stocked in one or two paddocks. Owners who have been able to spread their sheep out in unimproved bush country during toxic periods have been successful in escaping the disease", says the article.

Occurrence on Whole Range of Pasture Types

"... our experience in 1956 showed that the facial eczema could occur on a whole range of pasture types, from topdressed native pastures to sown down permanently improved New Zealand ryegrass strain pastures.

"The most intriguing mystery about facial eczema in Australia", says Mr Flynn, "is that the disease appeared for the first time in a serious form in the autumn of 1956 in an area in which sheep have been running since 1840 and in which topdressing and pasture improvement have been carried out since the early days of this century. It is impossible to believe that in all that time it was only in 1956 and again in 1959 and 1960 that suitable weather conditions occurred for the growth of the fungus. When this mystery is solved it is very likely that we will have solved the problem of facial eczema".

Research in East Gippsland

At present a facial eczema research station is being developed on known toxic pastures in East Gippsland. Research in this field station will include a study of the growth of the fungus under Victorian conditions and an attempt to define the precise factors which encourage and inhibit its growth.

The field station will include an area of flood irrigation and provision for spray irrigation to study the effect of varying applications of water on the growth of the fungus. At the same time the disease itself will be studied in sheep grazing on the station and the field research will be backed up by an extensive laboratory study of the fungus. Liver damage and toxicity of the various strains of the fungus will also be investigated.

Dangers of High-tensile Wire

WIDESPREAD increase in the use of No. 12½-gauge high-tensile fencing wire has followed the successful establishment of the sheep electric fence as an efficient means of subdivision. Selling at £5 a hundredweight compared with £4 5s. for standard No. 8 gauge wire, it goes roughly three times as far (1,458 yd against 546 yd) and has the same minimum breaking strain (1,350 lb). However, it has proved unexpectedly dangerous to handle, and experienced fencers have already been seriously injured through not knowing its unusual properties.

HIGH-TENSILE wire does not strain and set like No. 8 wire, but acts rather like elastic. If the strainer is abruptly released or the wire breaks, the whole length contracts violently. It is more dangerous still in a dip, where, if the tie-down breaks, the contraction is not gradual and partial as with No. 8 wire, but like the release of a bow string.

When this happened recently during the construction of a fence a hooked-on steel batten filled the role of the arrow and was propelled high in the air. On a second occasion the terrific force that was suddenly released fractured the

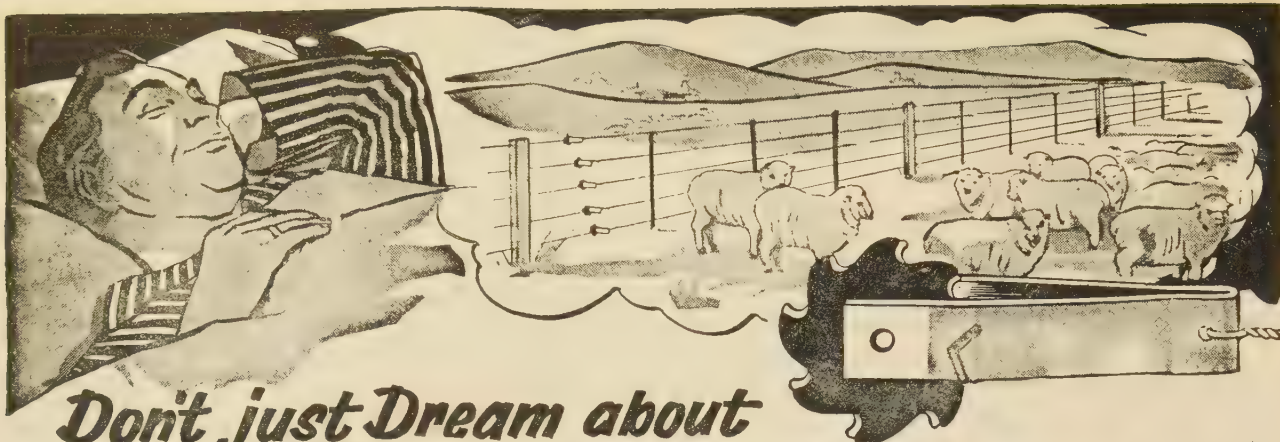
skull of one fencer and, if he had received the full impact, could have killed him. In another instance where a hammer blow was used to release the wire strainer a fencer badly bruised his thumb.

The troubles that barbed wire can give are well known; the very appearance of this material commands respect. Light high-tensile wire is economical, but its peculiar properties can make it a potentially dangerous material.

Manufacturers recommend that no fencing wire should be strained beyond 55 per cent of its minimum breaking strain. They claim that overstraining will reduce its service life. Tight straining is not so important with a sheep electric fence, in which shock is the main stock barrier, or when high-tensile wire is used on a standard fence, because its elasticity should ensure permanent tightness.

—J. D. CURRIE,

Farm Advisory Officer,
Department of Agriculture,
Hamilton



Don't just Dream about Good Fences ... Do Something about it! HAYES PERMANENT WIRE STRAINERS

The only method of keeping short strains tight is to use a Hayes Permanent Strainer on each wire. On long strains attach one strainer to each wire midway between strainer posts. Large roomy

reel with heavy galvanised sides holds 8ft. of No. 8 and 11ft. of No. 9 wire.

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DITCHING WITH EXPLOSIVES

By J. F. SCOTT,
Farm Advisory Officer,
Department of Agriculture,
Christchurch

THE problem of cutting drains where suitable machinery is not available or where conditions are unsuitable for heavy machines has been largely overcome in recent years by the use of explosives. Basically the method entails the simultaneous detonation of a number of charges of explosives laid along the line of the proposed ditch. The size of each charge, the distance between charges, and the depth at which they are placed will be determined by the size of the channel required and to some extent by the amount of water in the soil.

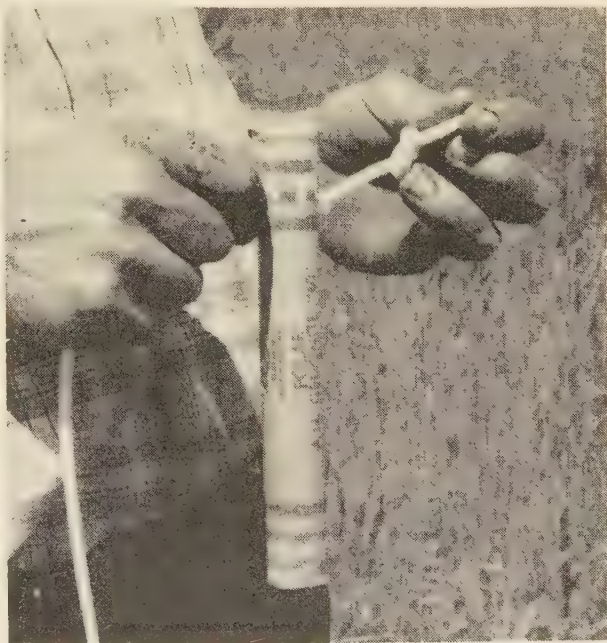
▼ Pierce a hole through each plug of gelignite with the wooden meat skewer supplied in the case.

▲ With explosives excavation of the ditch and spreading of the spoil are done in one operation.

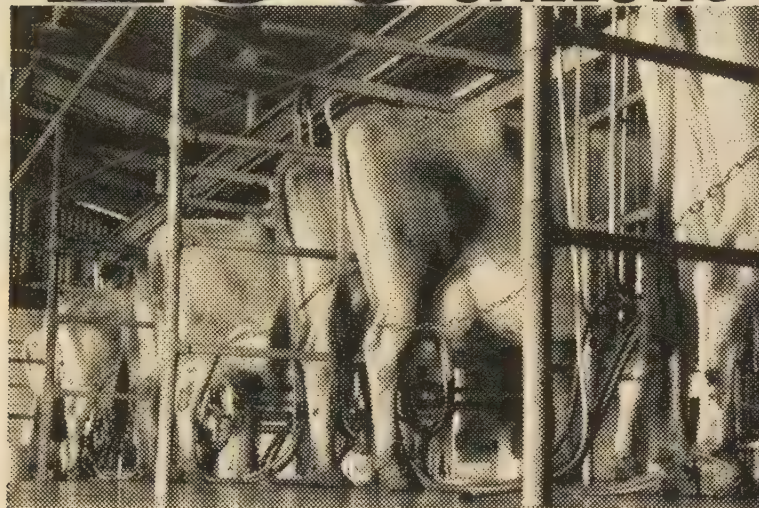
Thread an 18 in. length of detonating fuse through the plug of gelignite and knot one end.

FARMERS who have been unable to obtain the necessary machinery to drain swamps or who have found transport charges too high will be interested in this method. It is applicable only to wet, swampy conditions and the best results will be achieved when the soil is very wet.

When swamps are caused by runoff from a hill or seepage from a higher



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terrace the obvious solution is to provide a cut-off drain at the foot of the slope, and explosives have often done this job very effectively either by making a new channel or by opening up an old drain which has not been maintained. Swampy conditions may also be caused by blocked natural channels on flat land, and under these conditions also explosives can be used to re-form the channel. The explosive may leave a ragged ditch, but this is enough to cut off water and enable the adjacent land to firm up. Then a farm tractor and mounted blade can be used to tidy up.

Costs

Under average conditions a drain 3 ft deep, 6 ft wide at ground level, and 3 ft wide at the bottom can be blasted for about £4 per chain for materials. Preparing and laying the charges for 1 chain would occupy one man for about half an hour.

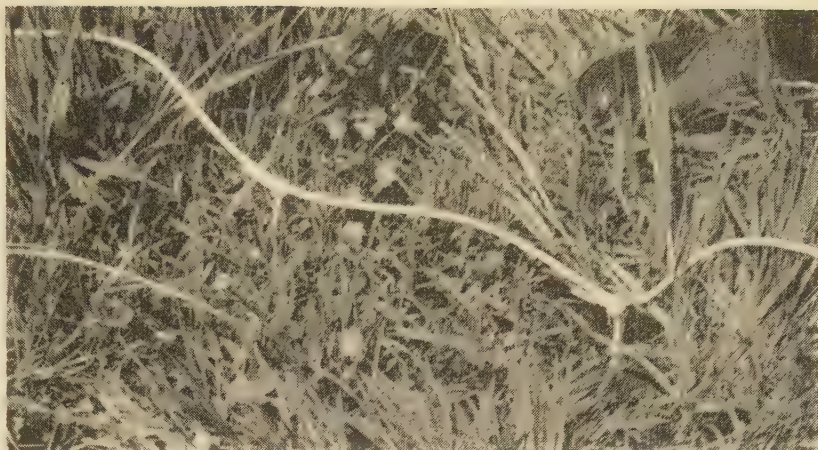
Materials and Method

The explosive used is "Polar" AN gelignite "60" in cartridges $1\frac{1}{2}$ in. in diameter, with **detonating** fuse (available in 500 ft coils), No. 6 plain detonators, and **safety** fuse. A bar for making holes and a wooden rod for positioning the charges complete the equipment needed.

Cut from the roll of detonating fuse a length equal to the length of drain to be blasted; this will be the main line. Pierce a hole through each plug of gelignite with the wooden meat skewer supplied in the case and thread about 18 in. of detonating fuse through the hole and knot it so that it cannot pull out. In this way prepare the necessary number of charges. Then lay out the main line of detonating fuse along the centre line of the proposed ditch, make holes every 2 ft with a bar, and insert the plugs, pushing them home with a wooden rod until the top of each plug is 6 in. to 1 ft below the surface; for very soft conditions the smaller measurement should be used. Then knot the free end of the short length of detonating fuse from each charge to the main line or bind it on with tape.

Examine a No. 6 plain detonator to ensure the inside is free from sawdust (which if present must be dislodged by **gentle** shaking) and insert one end of a length of **safety** fuse into the open end of the detonator and push it gently home. Then crimp the extreme open end of the detonator to the fuse with special crimping pliers which are available from most hardware merchants. (Safety fuse burns at 2 ft per minute, and as it is necessary to retire at least 150 yd from the point of the explosion, about 3 ft of fuse will give enough time under most conditions.) Then bind the detonator to one end of the main line by tape or

DITCHING WITH EXPLOSIVES



▲ As each charge is positioned the free end of the short length of detonating fuse is tied to the main line.

← The detonator with safety fuse attached is bound to one end of the main line.

▼ The safety fuse is ignited by placing the head of the match against the end of the fuse and drawing the side of the matchbox across the head of the match.



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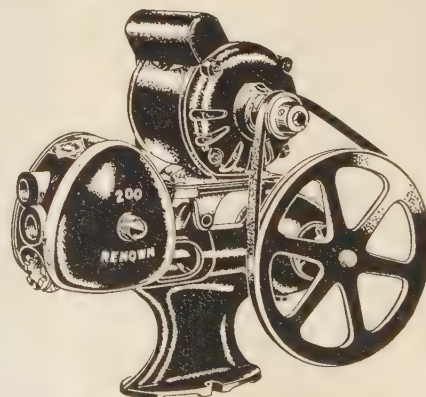
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DITCHING WITH EXPLOSIVES



This channel has been blasted through a peat swamp containing a considerable amount of buried timber.

with a short length of the insulated wire supplied with the detonating fuse.

After ensuring that all bystanders will be clear of the blast the operator can ignite the safety fuse by placing a match to its end and drawing the side of the match box across the head of the match (see the bottom illustration on page 87).

There is no limit to the length of drain which may be blasted in one operation when detonating fuse is used, but a short trial blast is advisable to check on the loading, depth, and spacing of the charges.

The drain which may be blasted is not restricted to the dimensions mentioned previously, for by increasing the size and number of charges channels up to 12 ft deep and 36 ft wide at ground level can be made in one operation. Recommendations for size and spacing of charges for larger drains have been made by Mr R. D. Hassed of Imperial Chemical Industries Ltd., and are published in the Canterbury Chamber of Commerce Agricultural Bulletin No. 370.

Safety Precautions

The explosives mentioned can be handled quite safely if simple precautions are observed. The following recommendations for accident prevention have been extracted from a lecture by Mr Hassed to the 1958 Farm Safety Officers' Training Course organised by the National Safety Association of New Zealand.

1. Explosives, safety fuse, and detonating fuse should be stored in a dry, well ventilated, and **locked** shed. Detonators should be stored under lock and key **separate** from the explosives and kept dry.
2. When handling detonators take the following precautions:
 - Don't leave them lying around, but lock them in the magazine.
 - Don't take them home, carry them in your pockets, or leave them where children will find them.
 - Don't put them near a flame or fire.
 - Don't knock them with a hammer or stone.
 - Don't crimp them with your teeth.
 - Don't pick sawdust from them with a pin, nail, pencil, or piece of wood.
3. Don't delay too long while lighting safety fuse. Failure to gauge properly the time taken to light the fuse and the time left to reach a place of safety can result in an accident.
4. Always ensure that all shots have fired before returning to the scene of a blast.
5. When blasting is in progress ensure that all possible approaches to the blast are well guarded so that anyone approaching the area may be warned.
6. Don't allow smoking or the use of naked lights by those handling explosives or working near them.
7. Take special care to keep explosives and detonators dry.
8. When crimping plain detonators on to safety fuse make sure the fuse is in contact with the detonating composition, but never use force or screw the fuse into the detonator.
9. Never crimp the detonator on the part that contains the detonating composition. The crimp should be $\frac{1}{4}$ in. to $\frac{1}{2}$ in. from the open end of the tube.
10. Don't handle explosives during the approach or progress of an electrical storm.
11. If gelignite cartridges have to be divided to make a small charge, they must be cut with a wooden knife. Metallic equipment should never be allowed to come into contact with explosives. Avoid touching the cut surface of the gelignite, as it can cause headaches.
12. If there is a misfire, wait at least two hours (and it is better to wait **24 hours**) before investigating. Failure to observe this rule is a major cause of accidents with explosives.
 - Used with intelligence and care explosives will continue to be a valuable aid to drainage of problem areas on the farm.

Farm Shelter can be Attractive



[Sparrow

By J. S. SAY, Horticulturist, Auckland, and K. H. MARCUSSEN, Horticulturist, Christchurch, both of the Department of Agriculture

▲ Groups of trees and single specimens can sometimes be planted in selected positions for shelter and shade without interfering too much with farm operations.

MOST parts of New Zealand are subject to strong winds throughout the year and the early settlers soon realised the need for shelter for their homes, stock, and crops. Much of the early planting was of pines, macrocarpa, and Lawson's cypress, and in some districts Lombardy poplars, all of which grew quickly under a wide range of soil and climatic conditions. This traditional planting is still being largely carried out with the result that many farming districts are dominated by one or other of these species. They are likely to continue to be the most popular shelter trees, but thought should be given to the many other species which could give equally good results and to the aesthetic side of shelter planting. As many of the trees which could be used are more particular in their requirements than the usual types, greater care must be exercised in their selection.

High shelter which is usually part of the farm shelter system should be set at a distance from the homestead, especially on the east and west, so that it is not shaded in winter.

Lower shelter of small trees, hedges and shrub borders, and perhaps a large deciduous tree on the west to give afternoon shade to the house in summer can be provided in the garden layout.

To get the best effect both from wind protection and to provide an attractive setting for the home, high and low shelter should be planned as one, even though they may not be linked physically.

Low Shelter for the House

Low shelter about the house itself may be provided by hedges or shrub borders, both of which may be from 3 to 4 ft to 12 to 15 ft in height. Where space is limited a trimmed hedge is probably the best, though it takes time to keep in order. An alternative is an

The Homestead

FARM buildings should merge into the landscape. A house set by itself in the middle of a paddock without any planting round it usually looks bleak and forlorn and must have a depressing effect on its inhabitants. The other extreme occurs when the

house is completely engulfed by high shelter belts and tall trees which cut out all sun and views as well as wind. The ideal is a home which is well protected from the worst winds, yet open to sun and views and which, with its garden, looks part of the countryside.

informal hedge of a single row of dense evergreen shrubs of one or more varieties. In an exposed situation a low hedge on the boundaries of the garden cannot provide adequate shelter.

The most effective planting is a shrub border either on its own or in front of a hedge. For maximum protection it should consist mainly of evergreen shrubs or have a continuous planting of evergreens along the back. Once established, shrub borders require very little maintenance and if well planned with a good selection of shrubs, they give interest throughout the year.

High Shelter for the House

A shelter of mixed trees can provide a wonderful background to the home and be just as efficient as one of a single species, especially if it is planned in conjunction with the shrub borders.

A mixed shelter consists of trees of different sizes, shapes, and colours. (See the diagrams on this page.) It should have a solid foundation of evergreen trees with a few deciduous kinds interspersed among them so that there will not be any gaps to allow a funnel of wind. The deciduous ones should be chosen for their autumn colour, spring flowers, interesting bark, or outline in winter. The taller material should be planted toward the back (or the middle if the shelter can be viewed from both sides), with the lower to the front, but interest can be added by bringing some taller specimens of special merit forward. Planting should not be in rows, for it spoils the effect. If upright rather than spreading trees are chosen, a shelter belt takes up little or no more room than a more conventional one.

To prevent mistakes when planting the mature height and spread of the trees should be known so that sufficient room can be left for them to develop. Fast-growing small trees or large shrubs such as wattles and akeake may be planted between the permanent plants to give shelter and fill in the gaps, but they must be removed as soon as they have fulfilled their purpose. If left too long, they will leave gaps in the lower part of the shelter belt when they are removed.

With multiple row shelters specimens of a different species can be introduced in the front row (or rows). In a shelter belt of Lawson's cypress some of its larger coloured varieties, *Thujopsis dolabrata*, or cedars could be used; *Pinus patula* could be used among *P. radiata* and *Cupressus macrocarpa* 'Aurea' with the ordinary green type of macrocarpa.

Where the shelter is several rows deep some deciduous trees could be used in the front row without decreasing the efficiency of the shelter. Silver birch, golden ash, copper beech, and

FARM SHELTER CAN BE ATTRACTIVE



Diagrams showing elevation and plan of an ornamental shelter belt, trees of different shapes, sizes, and colours being used. A solid foundation of evergreens gives protection from wind and the deciduous trees introduced at intervals add colour and interest. Shrub borders are planned in much the same way. Very small shrubs are usually planted in groups of three or more to give weight.



the smaller oaks are examples of some that could well be used.

Another way is to plant all the outside row of a different and lower-growing kind such as *Cryptomeria japonica elegans* in front of *C. japonica* or conifers in front of eucalypts. This treatment is particularly useful where the trees used in the centre tend to open up at the base and allow draughts.

Mixed conifers may be used in a single row shelter belt, but to get a good effect care is needed. The species used must have roughly the same rate of growth, ultimate height, and growth habit, and be carefully graded so that the belt will not appear ragged or uneven. *Chamaecyparis lawsoniana*, *Cupressus benthamii*, *C. arizonica*, and *Thuja plicata* could be combined. A shelter of this kind would make a good background to a planting of shrubs.

Existing shelters can have shrub borders or trees with contrasting colours or habits planted in front of them. For example, the white trunks of silver birch or the golden foliage of some conifers or the yellow flowers of wattles always show up against a dark green background.

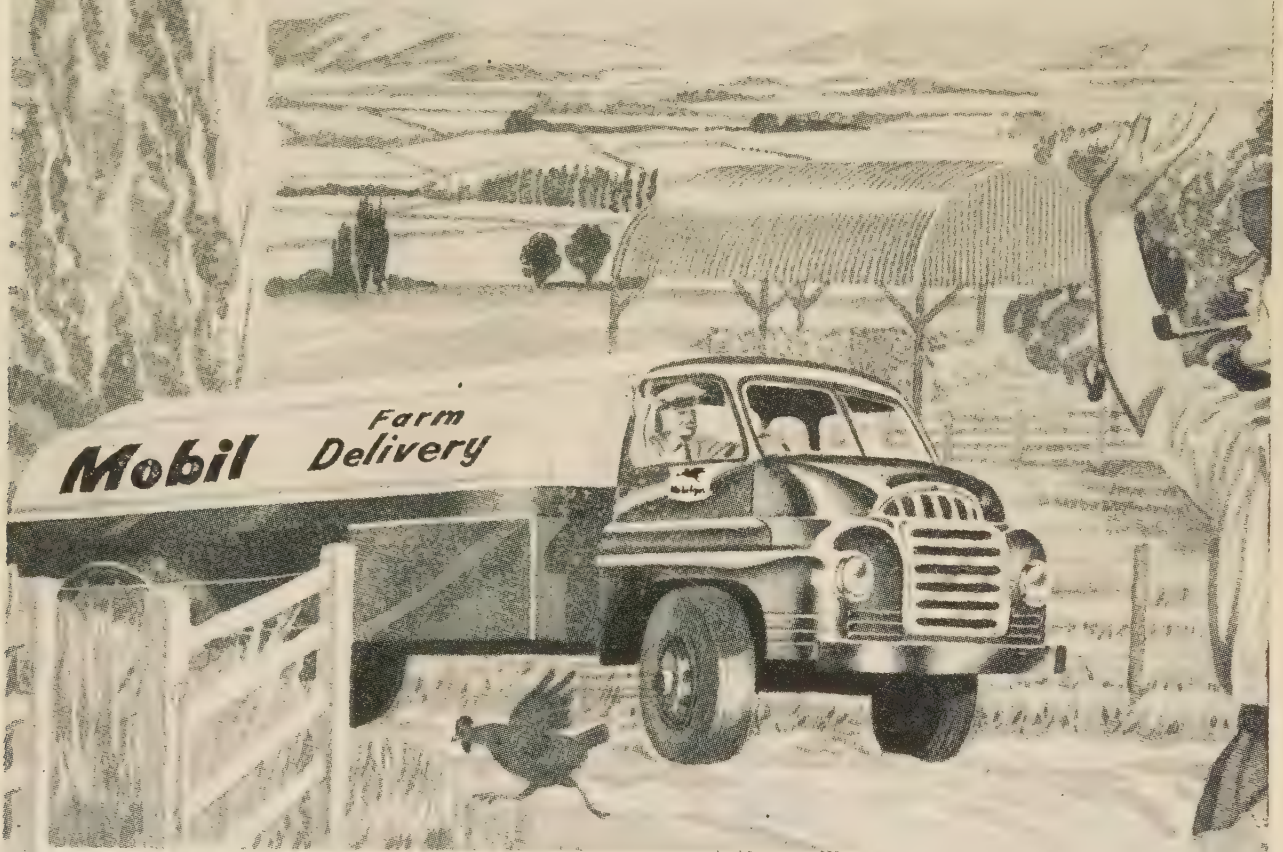
Establishment of young plants close to older trees is sometimes difficult and special attention should be paid to soil preparation and irrigation.

High Shelter about the Farm

Apart from the well known conifers not enough use is made of many others for shelter and farm woodlots. Their use would add variety to the country scene. Seldom seen are *Pinus muricata*, *P. laricio*, *P. ponderosa*, *Cupressus sempervirens stricta*, *Pseudotsuga taxifolia* (Oregon), *Sequoia gigantea*, *S. sempervirens*, totara, rimu, larch, taxodium, or metasequoia. The last three are deciduous. None of these is recommended for general planting, for they have particular soil and climatic requirements or are suitable only for specific purposes.

Eucalypts were used fairly extensively some years ago, but gradually lost favour, mainly because unsuitable species were grown. With many other species available today and with a better understanding of their requirements and limitations they are gradually coming back to use. They make excellent shelter and are very attractive trees.

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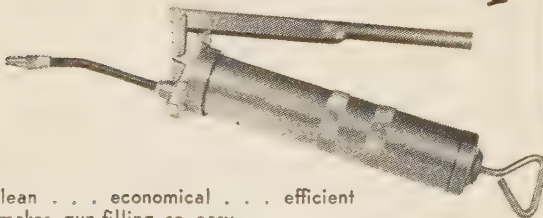


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FARM SHELTER CAN BE ATTRACTIVE



[Sparrow

A wide shrub border in front of an old belt of *Cupressus macrocarpa*.

Other evergreens which are little used as farm shelter but which would be suitable under some conditions are casuarina, giant bamboo, *Eugenia smithii* (acmena), *E. eucalyptoides*, *E. myrtifolia*, *Metrosideros villosa* (Kermadec pohutukawa), *M. tomentosa* (Christmas tree), *Cinnamomum camphora*, *Grevillea robusta*, *illex*, *lagunaria* (Norfolk Island hibiscus), karaka, puriri, and taraire. Most are very ornamental and could be used in selected positions.

Drives

Many farm houses are set well back from the road and provide good opportunities for avenue planting, which is usually purely ornamental, though it can serve as shelter. Few farmers can afford to set aside areas for avenues like those which provide imposing entrances to many old farm homesteads, but unless an adequate width can be spared to allow the trees to develop to their full extent and leave room for trucks and cars, avenue planting is better not attempted.

It is sometimes possible to obtain the effect by planting small trees beside the drive and larger ones well out into the paddocks. This may interfere with farming operations and the trees must be protected from stock. It is generally advisable to train the trees up on to high standards so that the spreading top growth is out of reach. Planting fastigate trees like upright cypresses or small shrubs at equal spaces up the drive is ineffective. A better effect can be obtained by planting shrub borders or a border on one side only. Where length or cost makes this impracticable a few bold groups at intervals will look well.

Scatter Planting

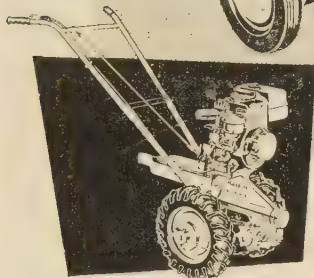
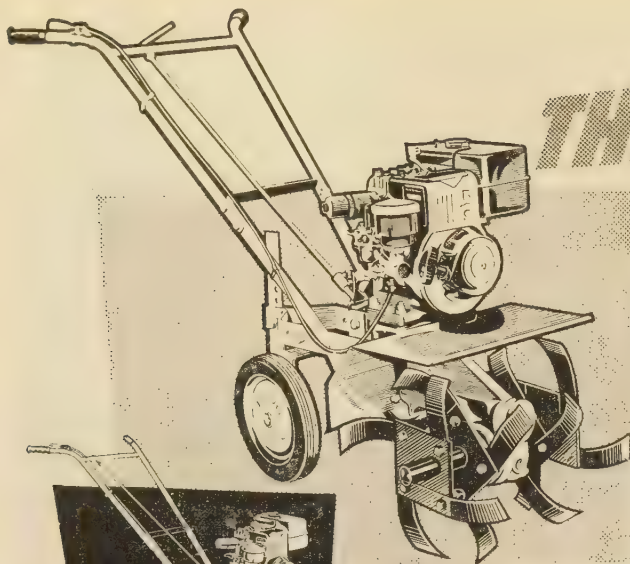
Greater use could be made of scatter plantings about the farm, which would give shelter and shade for stock, especially on dairy farms. Such plantings could become valuable assets if trees of economic importance are chosen. Where single trees or small groups are planted spreading types could be used to give maximum shade

and shelter. When carefully placed, scatter planting can do much to beautify the farm and homestead by providing backgrounds, framing views and forming vistas, or to cut out unpleasant views.

Placing requires care to prevent them from becoming a nuisance in the general management of the farm. There are often odd corners or areas which are of no value such as swampy patches which could be fenced off and planted with suitable trees. The swamp cypress (taxodium) and kahikatea (*Podocarpus dacrydioides*) for example will grow in very wet places. Trees near gateways make good markers when giving directions.

Roadside Planting

Planned roadside planting can make conditions on the farm more pleasant and can do much to beautify the countryside. For the farmer it can provide privacy for the home, cut down dust and traffic noise, and block out unsightly views such as hoardings



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and scars made by road construction work.

Great care must be taken that trees planted near the road do not themselves create traffic hazards.

Selection and Care

Trees and shrubs should be ordered early from a reliable nursery. No matter how good the plants are to start with, they can never make a good shelter belt if they are inadequately fenced, if insufficient space is allowed for them to develop, or if they are eaten bare at the base by stock. A shelter belt which allows winds and cold draughts through is often worse than none at all. A few trees and shrubs are poisonous to stock*. On no account should clippings be left lying about, as they are often more dangerous than the growing plant. Poisonous plants among the more common kinds include cherry laurel, rhododendron, cestrum species, ngaio (*Myoporum*), yews (*Taxus* spp.), and *Cupressus macrocarpa*.

* Bulletin No. 356, "Poisonous Plants in New Zealand", available from all offices of the Department of Agriculture, deals exhaustively with this subject.

GARDEN WORK FOR AUGUST



Silver birches and coloured conifers planted in front of a shelter belt.

Garden Work for August



Winter rains pack down the surface of some types of soil, forming a crust which prevents the exchange of gases between soil and air. If this crust is not broken, plant roots will suffer from an excess of carbon dioxide and a lack of oxygen, which restrict their growth and can eventually kill them.

As soon as the soil is dry enough for cultivation, fork or hoe between the plants so that this crust is broken, but be particularly careful not to dis-

Some shrubs, particularly roses, are likely to die back after planting due to the sudden reduction of the root system on lifting. Pruning at planting counteracts this. Die back should not be cut out until adequate fresh growth has been made, as the sap from the dying shoots may help in the recovery of the plant, but, if die back is associated with disease, it must be removed at once. When cutting out dead wood always prune as illustrated in the section under "Roses" to avoid further die back.

Manuring

Manures applied to the soil now before sowing or planting, or to established plants, will be available to the plants as growth commences. Manuring earlier in winter may result in loss of some soluble fertilisers in the drainage water; this loss is considerable in heavy rainfall areas.

A balanced plant diet provides nitrogen, phosphate, and potash in more or less equal amounts. Nitrogen is needed for growth, phosphates for good root development and early maturity, and potash to improve flowering and fruiting and to increase disease resistance. Each is complementary to the others.

If blood and bone is used, add sulphate of potash at 4 parts of blood and bone to 1 part sulphate of potash, as blood and bone contains nitrogen and phosphate but no potash.

Balanced fertiliser mixtures should be used at 4 oz to the square yard.

Later in the season, for example, when the first flush of flowers of roses or herbaceous plants is over, additional light dressings of blood and bone are beneficial.

ROSES

Rose Manuring

Rotted animal manure is still the best for roses, with a light dressing of a balanced fertiliser mixture where necessary.

Supplementary foliage feeds may be given in the spring as soon as the new foliage is mature—about late October—and again after the first flush of flowers—about early December. Proprietary foliar feeds are satisfactory if directions are followed carefully and they may be included with sprays to control pests and diseases.

An alternative can be made up from:
3 parts by weight of urea
2 parts by weight of ammonium phosphate
1½ parts by weight of potassium nitrate
and applied at ½ oz in 1 gallon of water to the leaves.

Do not increase this rate or the leaves will be damaged. Rain after application does not materially affect the results.

When to Prune Roses

Pruning of roses in June when the plants are dormant is said to increase vigour, but there are several disadvan-

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

turb the plants or damage any of the roots. The roots of many shrubs and herbaceous plants are so shallow that cultivations should be to a depth of only 1 or 2 in. If a plant is disturbed or has been loosened by winter frosts, it should be firmed in at once to prevent the root system from drying out. Inspect newly planted shrubs to make sure that they are firm in the ground.



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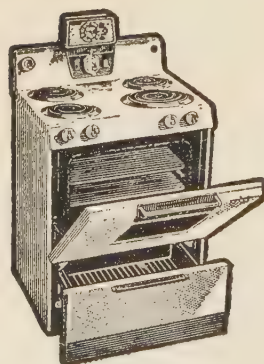
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tages to such early pruning. The selected buds may be damaged before growth starts or they may be stimulated into premature growth, which is readily damaged by cold winds and frosts. The soft young shoots can be so severely checked by a late frost that a full season is needed for recovery.

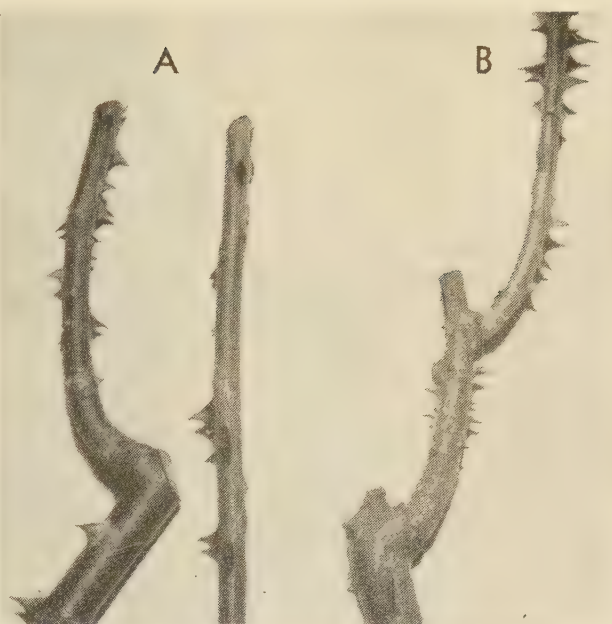
It is therefore preferable to wait until growth begins (July in the north, August in colder districts) before pruning, so that the maximum protection is afforded by the top growth and branches. Very late pruning may delay flowering (though there is normally little difference in flowering dates of roses pruned in June and those pruned in July), but it will not otherwise affect the growth of the plant, even when top shoots are up to 4 in. long at pruning.

It may reduce the incidence of die back, as dead wood is removed and other parts pruned when the sap is rising freely. Under such conditions wounds heal more rapidly and the possibility of infection is lessened. Another advantage is that the selection of strong, healthy buds is easier,

as they are more obvious at this time and they develop rapidly after pruning. If the buds selected in June to continue the growth of the bush are later destroyed or damaged, less desirably placed or weaker buds have to be used.

Roses purchased from nurseries and retail shops are usually not pruned, but are cut back for packing only. Those which were planted in June or July should be left until growth begins in the spring. Very hard pruning in June or July may weaken a newly planted rose if the growing conditions are not good. Those which are purchased in August can be pruned immediately before planting.

PRUNING OF ROSES



[R. W. Orr

A—Correct pruning of roses. The main cut is made just above a bud, slanting down on the opposite side.
B—A branch which has not been pruned cleanly.

BEFORE



A rose bush planted as received from the nursery and then pruned (below).

AFTER



How to Prune Roses

When roses are lifted many roots are inevitably broken or cut. These should be trimmed with a sharp knife before planting so that wounds will heal over and more roots will grow. To balance the initial loss of root top growth must be shortened back. If this is not done, the branches will die back, the depleted root being unable to support all the original top growth.

Roses which are growing under ideal conditions—a well drained soil with plenty of organic matter in it to hold moisture and a climate which is cold enough in winter to ensure complete dormancy and not too hot and dry in summer—can be pruned hard at planting to the third or fourth bud from the base of last season's growth.

Lighter pruning is preferable if soil and climate are not ideal, but some pruning is essential, and for the first season flowers must be cut off as soon as they fade to prevent loss of vigour from the formation of unwanted seeds.

Established roses require annual pruning. Remove all dead and weak wood, branches which cross and rub other branches, and those which are growing toward the centre.

Pruning of the different types of roses is as follows:

Hybrid Teas, Hybrid Perpetuals, Grandiflora (Examples: Peace, Virgo, Perfecta, My Choice):

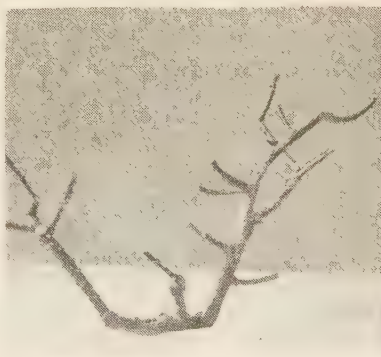
Concentrate on removing old exhausted wood, including all small

BEFORE



Established hybrid tea roses before and after pruning.

AFTER





Slim Anna says;

"Summer's for the slim,
the figure-proud.
Will you be basking in
admiration as well as
sunshine?

NOW is when you do
something about it."

ORANGES are your *natural* ally.
Eat them whole between meals
to restrict your appetite for high-
calorie, fat-forming foods. That
way they're rich with protective
and tonic virtues too. The juice
gives you vital Vitamin C. The
succulent "flesh" provides proto-
pectins to improve digestion,
inositol to protect the liver from
harmful fatty deposits, bio-
flavonoids to keep the tiny blood
vessels elastic and youthful and
Pro-vitamin A for eye and skin
health.



twigs on which the flowers were borne. The remaining branches should be strong and well spaced. Shoots made last summer must be pruned back, according to their vigour, so that they will grow and flower well. Very weak, thin shoots are cut away completely. Very strong, thick shoots are pruned very lightly, about one-third of their length being removed, to a sound bud facing toward the outside of the bush. (Buds normally grow out in the direction in which they are pointing, and advantage can be taken of this to increase or decrease the space between two more or less parallel branches and so improve the shape of the bush.) Shoots of medium strength and thickness are cut back about half-way, seven or eight buds, and weaker ones, if they must be retained, to two or three buds from the base.

Another method of arriving at about the same result of pruning according to vigour is to remove all wood of less than $\frac{3}{8}$ in. diameter. This will ensure that all weak, thin shoots are eliminated. A very strong, thick shoot would have only a small portion at the top which is less than $\frac{3}{8}$ in. diameter, while a weaker, thinner shoot would have proportionately more to be pruned away. The measurement decided on should be varied according to variety, being larger for strong-growing varieties such as Peace, and smaller, say $\frac{1}{4}$ in., the thickness of a lead pencil, for weak-growing varieties like Picture.

Growth from ground level is generally more vigorous and requires less pruning than last summer's growth from secondary branches higher up the bush. Adequate manuring and regular pruning will ensure a plentiful supply of vigorous young growth from the base of the plant, so that the older parts can be constantly removed.

Watershoots (tall, succulent shoots which arise at or below ground level and produce one head of flowers at the tip late in the season) present a problem to many home gardeners. The stems have a large pith which is exposed if they are cut back hard, and they are very susceptible to injury in winter and to die back.

If possible, watershoots should be cut back to ground level, but if they must be retained to produce a balanced bush or through lack of other more suitable shoots, they should be pruned very lightly by removing the flowering head only. The development of watershoots can be checked during the growing season by pinching out the tips when they are 6 to 9 in. long. This causes them to branch and produce several heads of flowers.

Watershoots are **not** suckers. Suckers always rise at or below ground level, and have leaves and stems typical of the multiflora rootstock (more like a wild rose) and very different from

BEFORE



Hybrid tea roses before and after pruning.

AFTER



the named variety. Flowers from suckers are worthless, so the sucker should be wrenched out from its point of origin as soon as it is recognised. Wrenching is better than cutting with a knife or secateurs, as it removes all buds of the sucker.

Standard rose trees are pruned in the same way as above. Hard pruning is not recommended, as it may lead to die back, and if a main branch dies, the shape of the bush is ruined.

... PRUNING OF ROSE BUSHES

Should this occur, it may be possible to tie down a young lateral to fill the gap. Standard roses growing among bush roses or other plants which shade the main stem are frequently more vigorous in the hotter parts of New Zealand. Sun scorch, particularly damage to the bark which is common in parts of Australia, may be more common here than is generally realised.

Floribunda and Polyantha roses (examples: Frensham, Fashion, Masquerade):

Cut out any very thin, weak growth. Cut back two-year-old shoots to within a few buds of the base. Cut away clusters of dead flower heads to the second or third bud below the cluster. Strong, young stems which will flower next season may be tipped or left unpruned. Standard floribunda roses are pruned in the same way.

Shrub roses and Wichuraiana ramblers (example: Dorothy Perkins, most old-fashioned roses):

These should have been pruned immediately after flowering by cutting out all stems which have flowered and tying in the new stems which will flower next season.

Climbing roses:

Enough old stems are retained, with the new ones, to cover the area of trellis, etc., when spaced out. Cut back laterals which have flowered to within two buds of the old stem from which they rise. Each year cut out one or two of the oldest stems to ground level or to a young side branch.

As a precaution against the entry of disease spray roses immediately after pruning with a fungicide such as bordeaux mixture (4 oz of bluestone, 5 oz of hydrated lime to 4 gallons of water) or zineb.

Winter-flowering Shrubs

Prune winter-flowering shrubs as soon as they have finished flowering so that the maximum growth is made before next winter.

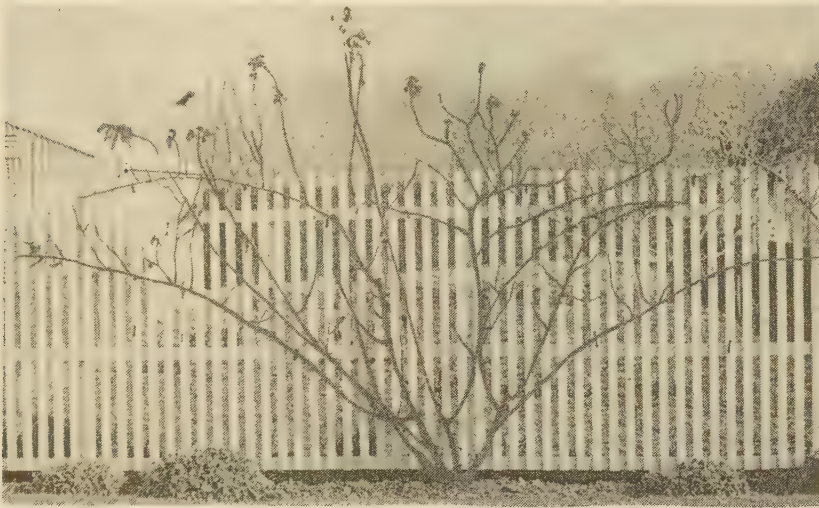
Propagation

Lift and divide herbaceous plants, but do not propagate diseased or inferior types. When dividing a large old clump discard the central, exhausted portion. In home gardens divisions should have three or four buds or shoots, as smaller portions may die.

Trim gerbera divisions so that only 3 or 4 in. each of roots and leaf remain. Place the roots closely together in the planting hole, as new roots develop on the outside of these. Plant carefully and firmly so that the plant is at the same level in the soil as

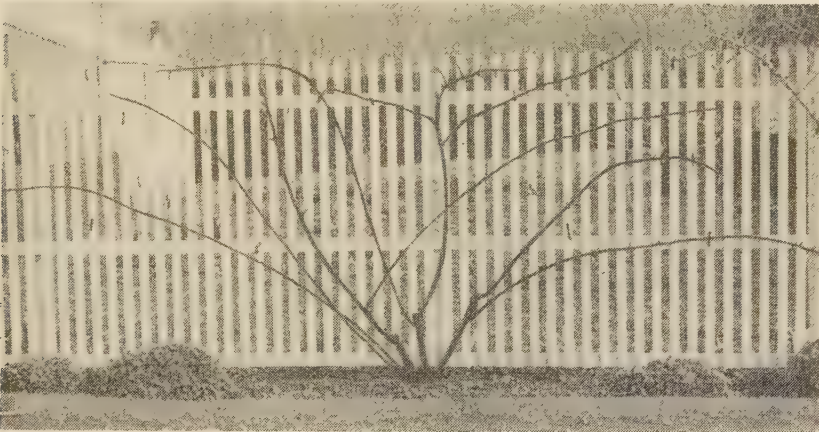
GARDEN WORK FOR AUGUST

BEFORE



Climbing rose before and after pruning.

AFTER



formerly. If planted too deep, the crown will rot; if too shallow, the roots are exposed and dry out.

If plants with fleshy roots, such as phlox, are transplanted, plants grow from the broken roots left in the soil. Alternatively, a few large roots severed from the plant may be cut into lengths of from 1 to 3 in. and placed horizontally in prepared soil in an open bed or a box and covered with a thin layer of fine soil or sand.

Cuttings of herbaceous plants are taken from young shoots in spring when they are 3 to 4 in. long. Cut those which have hollow stems with a small portion of the crown attached. Cut others immediately below a leaf joint. Remove lower leaves and press the cuttings upright in a sandy soil mixture close together in a frame or covered pot or box. A mixture of equal parts of sieved peat and sand with a little lime if the peat is added is one of the best mixtures for rooting.

Lachenalia leaves cut from the bulbs and then pressed in the soil produce bulbils at the base, and this is an easy method of increasing stock.

Cormlets from good varieties of gladioli will produce flowers within two seasons if sown under good conditions. Take out shallow drills on well manured, well cultivated, and well drained ground. Sow the bulbils about 2 in. apart in the drill. Bulbils may be soaked in cold water overnight or placed in damp sand in a warm room for a few days before sowing to accelerate germination.

House Plants

Pot up house plants. Many plants grow and flower better in small pots if they are given supplementary liquid fertiliser frequently during the growing season (August/March), so do not pot on such plants as maidenhair fern or African violet unless really necessary. It is often sufficient to remove

the sour surface soil to a depth of between $\frac{1}{2}$ in. and 1 in. and to replace this with fresh well firmed potting soil.

Hoya rarely needs more than this treatment; in fact a little compost to replace the sour surface soil each early spring is usually sufficient to maintain growth and flowering. Good drainage is essential. Hoya makes a lovely house plant, though it is slow to begin flowering well, unless the ideal position is found for it. A warm, even temperature and shelter from winds and draughts and from direct sunlight are required. Hoyas are often at their best when grown in warm, sunny porches, with the pot in the shade and the growths trained up above the glass level. In this way the plant has good light and warmth, but no direct sun during midday. Another good way of training hoya is to place several canes round the pot and to wind the growths round these about 4 in. apart. Flowering should commence in the third season and increase steadily. Remove the dead flowers only and do not cut back the stem, as next year's crop comes from the old spurs.

Yellowing leaves and lack of growth and flowers are more often due to faulty drainage than to any other factor.

Floral Decoration

Blossom of almond and plum does not last long, but its beauty is appreciated all the more for that reason. Japanese-style arrangements are most suitable both in character and by tradition for these flowers. Magnolias, too, particularly *Magnolia soulangeana*, look best in a very simple informal arrangement in which there is nothing to detract from the beauty of the flower.

In any garden where it will grow the winter-flowering *Jasminum polyanthum* is lovely in colour, form, and scent for flower arranging. It lasts well in water and its trailing habit is valuable where a fluid informal line arrangement is desired, as it will curve downward naturally from the rim of a container. When the old rose tint on the back of the petals can be matched by a rose or some other flower, the effect is outstanding.

Colour matching of flowers is frequently ignored in planting a garden, but by careful selection of varieties this can be achieved and both the flower borders and cut flower arrangements are improved.

Large designs call for bold, colourful flowers such as waratah, protea, banksia, and leucospermum. If only a few of these are available, branches of blue gum, phoenix leaves, or preserved beech leaves may be used for the main part of the design, with the flowers grouped at the focal point.

Sour Cream Cookery

By JANET W. ROBERTS,
Home Science Instructor,
Department of Agriculture,
Auckland

SOUR cream gives richness to a long list of Russian specialities and is one of the most widely used flavouring ingredients in Austria and Hungary. It is also very popular in America. If you have some cream that goes sour, don't throw it out; try some of the following recipes.



[Sparrow

This stew made from veal flavoured with paprika is delicious; sour cream is stirred in to thicken it just before it is served. The recipe is on this page.

Savoury Recipes

Bortsch (Russian Soup)

4 large raw beetroots	1 pint of vegetable stock
2 tomatoes	1 pint of meat stock
2 onions	$\frac{1}{2}$ cup of sour cream
1 teaspoon of mixed herbs	1-2 oz of butter
Celery salt to taste	Salt and pepper

(4 servings)

Peel the beetroots, tomatoes, and onions and cut them into small pieces. Melt the butter in a large pot and cook the vegetables gently in this for about 15 minutes. Add the stock, mixed herbs, celery salt, and seasoning to taste and simmer for about one hour. The soup should be a rich red. Stir in the sour cream just before serving.

Veal Paprika

2 slices of side bacon	3 medium onions (sliced)
2 lb of veal steak	1 tablespoon of paprika
2 tablespoons of flour	2 cups of water
$\frac{1}{2}$ teaspoon of pepper	1 cup of sour cream
$\frac{1}{2}$ teaspoons of salt	
2 tablespoons of fat	

(6 servings)

Cut the veal into $1\frac{1}{2}$ in. pieces. Blend together the flour and half a teaspoon of salt and pepper, and roll the pieces of meat in the blended mixture. Cut the bacon into cubes and braise it in

a heavy saucepan. When well done add the onions and veal and brown them. Sprinkle with the paprika, the remaining teaspoon of salt, and add the water. Cover, simmer until tender (one and half to two hours). Stir in the sour cream gradually over very low heat; bring to serving temperature.

Ham and Mushrooms in Sour Cream

1 cup of cooked ham (cut into strips)	2 teaspoons of flour
$\frac{1}{2}$ cup of chopped onions	1 cup of sour cream
1 oz of butter	1 cup of grilled, sliced, and drained mushrooms

(4 servings)

Cook the ham and onion in butter until the onion is tender but not brown. Sprinkle with the flour; gradually stir in the sour cream. Add the mushrooms. Cook over low heat, stirring constantly, just until the mixture thickens (two or three minutes). Garnish with parsley. Serve with fluffy rice.

Fillets of Fish with Sour Cream

$1\frac{1}{2}$ lb of filleted fish	Browned breadcrumbs
2 large onions	1 oz of butter
Sour milk as required	Paprika
3-4 tablespoons of sour cream	Salt and white pepper to taste

(4 servings)

Butter an ovenproof dish. Slice the onions and place them at the bottom of the dish. Add the fillets of fish, salt and pepper, and sprinkle with the paprika. Add sufficient sour milk almost to cover the fish. Cook at 350 degrees F until practically all the milk is absorbed. A few minutes before serving spread the cream over the top, sprinkle with a little more paprika, and the browned bread-crumbs.

Sour Cream Sauce for Vegetables

1 cup of sour cream	1 oz of butter
2 teaspoons of chopped parsley	$\frac{1}{2}$ teaspoon of salt
	$\frac{1}{4}$ teaspoon of paprika

Combine all the ingredients, heat, and serve over asparagus, carrots, broccoli, sprouts, etc.

Sour Cream Sauce

(for serving with savoury pies, pizza, and fish salads)

$1\frac{1}{2}$ cups of sour cream	2 teaspoons of Worcestershire sauce
$\frac{1}{2}$ cup of chopped onion	$\frac{1}{2}$ teaspoon of paprika
1 teaspoon of salt	2 tablespoons of horse radish sauce
$\frac{1}{2}$ teaspoon of garlic salt	
$\frac{1}{2}$ cup of mayonnaise	

Combine the ingredients in the order given and blend thoroughly.

Salad Dressing

1 cup of sour cream	2 teaspoons of salt
1 egg	1 teaspoon of dry mustard
$\frac{1}{4}$ cup of vinegar	$\frac{1}{8}$ teaspoon of pepper
1 tablespoon of sugar	

In the top of a double boiler mix the sour cream, beaten egg, vinegar, and sugar. Add the salt, mustard, and pepper and mix well. Cook until thick (five to eight minutes) and smooth, stirring all the time.

Scones

8 oz of flour	2 teaspoons of baking powder
2 oz of butter	1 teaspoon of salt
Sour cream as required	A little beaten egg

Sift the salt, baking powder, and flour together. Rub the butter into the flour. Add enough sour cream to make a soft dough, using a knife for mixing and tossing the mixture at the same time. Roll out lightly on a floured board to about $\frac{1}{2}$ in. thickness and cut. Brush with the beaten egg. Bake at 450 degrees F for 10 to 15 minutes.

Sweet Recipes

American Cheese Cake

Shell

$\frac{3}{4}$ lb of wine biscuits	1 oz of melted butter
$\frac{1}{4}$ cup of sugar	

Filling

2 eggs	$\frac{1}{2}$ pint of sour cream
$\frac{1}{2}$ cup of sugar	1 teaspoon of vanilla
1 teaspoon of vanilla	2 tablespoons of sugar
3 oz of soft cream cheese	

Shell: Crush the biscuits to make $1\frac{1}{2}$ cups of fine crumbs; mix with one third cup of sugar and the melted butter. Mix well and press on the bottom of a Swiss roll tin.

Filling: Beat the eggs until light in colour and beat in half a cup of sugar; add 1 teaspoon of vanilla and the cheese. Pour this filling into the pie shell. Bake for 20 minutes at 350 degrees F. Take out and cover with the sour cream to which the 2 tablespoons of sugar and the remaining 1 teaspoon of vanilla have been added. Put in the refrigerator overnight. Take out one hour before serving and cut into pieces $1\frac{1}{2}$ in. square.

Honey Cake

oz of sugar	1 $\frac{1}{2}$ tablespoons of honey
cup of thick sour cream	$\frac{1}{2}$ teaspoon of bicarbonate of soda
oz of flour	

Stir the sugar into the cream. Sift the flour into the cream and sugar and mix well. Add the honey and

bicarbonate of soda. Beat well for five minutes or so. Pour the mixture into a buttered tin and bake for 30 to 40 minutes at 350 degrees F.

The following recipe is for a delicious cake with sour milk as an ingredient.

Banana Cake

1 $\frac{1}{2}$ cups of sugar	1 teaspoon of bicarbonate of soda
2 oz of butter	4 tablespoons of sour milk
1 cup of mashed banana	$\frac{1}{2}$ cup of chopped nuts
2 eggs	1 $\frac{1}{2}$ cups of flour
Pinch of salt	

Beat the sugar, butter, and banana to a cream. Add the soda and eggs. Sift the flour and salt and add alternately with the milk. Beat thoroughly. Bake in a greased shallow tin at 400 degrees F for 40 minutes.

Mock Cheddar Cheese

3 gallons of thick, sour, skimmed milk	2 teaspoons of salt
$1\frac{1}{2}$ cups of sour cream	$1\frac{1}{2}$ teaspoons of soda
	4 oz of butter

Use a cooking or dairy thermometer.

1. Heat the milk to 115 degrees F or until you can just bear to put a hand to the bottom of the saucepan.
2. Set on the back of the stove and keep hot for half an hour.
3. Drain through a cloth, removing the whey.
4. Mix thoroughly with the soda and butter.
5. Let the mixture stand for two hours. (It can stand overnight.)
6. Mix with 1 cup of the cream.
7. Melt in the top of a double boiler. This will take at least half an hour.
8. When cooked smooth and free of lumps add the remaining half a cup of cream.
9. Add the salt and stir.
10. Pour into a buttered glass or china dish and allow to ripen for five days.
11. If not used after five days, cover with paraffin wax.

To Make Fresh Cream Sour

Stir 2 tablespoons of lemon juice into $\frac{1}{2}$ pint of cream. Set the mixture aside in a warm place for a little while. Unsweetened condensed milk may be soured in the same way.

To Make Fresh Milk Sour

Stir 1 tablespoon of lemon juice into $\frac{1}{2}$ pint of milk. Evaporated milk may be soured in the same way.

Fibreglass Curtains

THE latest material for curtain fabrics is American fibreglass. Fibreglass material is woven in various thicknesses and attractive weaves and is available in plain colours or in patterns with delightful modern designs. Though this material does not appear to be very different from other curtaining, it certainly is.

GOOD-QUALITY fibreglass fabric is expensive, but it will last for a very long time. As sunlight will not rot or fade the curtains, they need not be lined. Because fibreglass is fireproof, it is often used for theatre curtains. It is also water repellent and moth proof.

Fibreglass curtains drape beautifully and have an attractive sheen. The material will fray and care must be taken not to snag or tear it. Very poor-quality fibreglass may rub into holes if the curtains are subjected to much friction.

Sewing Fine Fibreglass Fabrics

1. Release pressure from the presser foot.
2. Release the top and bottom tensions.
3. Sew long stitches—eight to nine per inch.
4. Use a sharp-pointed needle, such as a No. 18.
5. Use mercerized cotton No. 50.

Fibreglass material washes and dries quickly. It does not shrink or stretch and it need not be dripped dry or ironed.

Washing Fibreglass Curtains

1. Shake the curtains to remove dust.
2. Remove all hooks or pins to avoid rust stains.
3. Wash by hand in lukewarm water, using a mild detergent. (Do not soak or twist the curtains.)
4. Rinse thoroughly. (Do not bleach or starch the curtains. Squeeze them gently after rinsing.)
5. Roll the curtains in a turkish towel.
6. Rehang them while they are still damp.

—JANET W. ROBERTS,
Home Science Instructor,
Department of Agriculture,
Auckland

Cardigan in 2-ply or 4-ply Wool

THE cardigan illustrated at right is stylish for any woman, no matter what her age. Directions for knitting it in 2-ply or 4-ply wool are given below.

ABBREVIATIONS: K., knit; p., purl; st., stitch(es); rep., repeat; in., inch(es); inc., increase; dec., decrease; beg., beginning; tog., together; st.st., stocking stitch; foll., following; patt., pattern; cont., continue.

Measurements: Length 21in.; bust 36in.; sleeve seam 17½in.

Materials: 6oz. of 2-ply, or 10oz. of 4-ply wool; 2 No. 8, 2 No. 10, and 2 No. 12 knitting needles; 6 buttons.

Tension: 8 st. to lin. (2-ply wool); 6 st. to lin. (4-ply wool).

N.B.: The first figures given are for 2-ply wool; the figures in brackets are for 4-ply wool.

The Back

Using No. 12 (10) needles, cast on 119 (84) st. and k. 4 rows.

Change to No. 10 (8) needles and the foll. patt.:—

1st row: * K. 3, p. 1, k. 3. Rep. from * to end.

2nd row: P.

These 2 rows form the patt. Rep. them until work measures 4½in. from lower edge.

Change to No. 12 (10) needles and cont. in patt. for 2in.

Change to No. 10 (8) needles and cont. in patt., inc. 1 st. both ends of next row and every foll. 4th row until 145 (108) st. are on the needle.

Cont. straight until work measures 13½in.

To Shape Armholes

Cast off 4 st. at beg. of next 2 rows, then k. 2 tog. at each end of every row until 119 (84) st. remain.

Cont. straight until work measures 21in.

To Shape Shoulders

Cast off 13 (7) st. at beg. of next 6 (8) rows.

Cast off.

Pocket Linings

Right Front (2-ply Wool)

Using No. 10 needles, cast on 32 st. 1st row: * P. 1, k. 6. Rep. from * to last 4 st., p. 1, k. 3.

2nd row: P.

Rep. these 2 rows until work measures 4in., ending with 1st row. Leave st. on spare needle.

Left Front (2-ply Wool)

Using No. 10 needles, cast on 32 st. 1st row: * K. 3, p. 1, k. 3. Rep. from * to last 4 st., k. 3, p. 1.

2nd row: P.

Rep. these 2 rows until work measures 4in., ending with 1st row.

Leave st. on spare needle.

Right Front (4-ply Wool)

Using No. 8 needles, cast on 24 st. 1st row: K. 3, * p. 1, k. 6. Rep. from * to end.

2nd row: P.

Rep. these 2 rows until work measures 4in., ending with 1st row.

Leave st. on spare needle.

Left Front (4-ply Wool)

Using No. 8 needles, cast on 24 st. 1st row: K. 6, * p. 1, k. 6. Rep. from * to last 4 st., p. 1, k. 3.

2nd row: P.

Rep. these 2 rows until work measures 4in., ending with 1st row.

Leave st. on spare needle.

The Right Front

Using No. 12 (10) needles, cast on 56 (42) st. and k. 4 rows.

Change to No. 10 (8) needles.

1st row: * K. 3, p. 1, k. 3. Rep. from * to end.

2nd row: P.

Rep. these 2 rows until work measures 4½in., ending with 1st row.

Next row: P. 14 (11), k. 32 (24), p. 10 (7).

Next row: Patt. to end.

Next row: P. 14 (11), k. 32 (24), p. 10 (7).

Next row: Patt. 10 (7), cast off 32 (24), patt. to end.

Next row: P. 14 (11), p. across right front pocket lining st., p. to end.

Change to No. 12 (10) needles and cont. in patt. for 2in., fin. at front edge.

Change to No. 10 (8) needles and cont. in patt., inc. 1 st. at end of next row and every foll. 4th row until 69 (54) st. are on needle, then work straight until front measures 13in., ending at straight edge.

To Shape Front and Armhole

1st row: K. 2 tog., work to end.

Work 3 rows without shaping.

5th row: As 1st row.

6th row: Cast off 4, work to end.



7th row: Work to last 2 st., k. 2 tog.
 8th row: K. 2 tog., work to end.
 9th row: K. 2 tog., work to last 2 st., k. 2 tog.
 Work 3 rows in rib, dec. 1 st. at armhole edge on each row.
 13th row: As 9th row.
 14th row: As 8th row.
 15th row: As 7th (in patt.).
 This completes armhole shaping.
 Cont. in rib, dec. 1 st. at front edge on 2nd row and every foll. 4th row until 39 (38) st. rem.
 Cont. in patt. until front measures 21in., ending at armhole edge.

To Shape Shoulder

1st row: Cast off 13 (7) st., work to end.
 2nd row: Work to end.
 Rep. these 2 rows once (twice).
 Cast off rem. st.

The Left Front

Using No. 12 (10) needles, cast on 56 (42) st. and k. 4 rows.
 Change to No. 10 (8) needles.
 1st row: * K. 3, p. 1, k. 3. Rep. from * to end.
 2nd row: P.
 Rep. these 2 rows until work measures 4½in., ending with a 1st row.
 Next row: P. 10 (7), k. 32 (24), p. 14 (11).

Next row: Patt. to end.
 Next row: P. 10 (7), k. 32 (24), p. 14 (11).
 Next row: Patt. 14 (11), cast off 32 (24), patt. to end.
 Next row: P. 10 (7), p. across left front pocket lining st., p. to end.
 Change to No. 12 (10) needles and cont. in patt. for 2in., fin. at side edge.

Change to No. 10 (8) needles and work in patt., inc. 1 st. at beginning of next row and every foll. 4th row until 69 (54) st. are on needle, then work without shaping until front measures 13in., finishing at straight edge.
 Cont. to match right front.

The Sleeves

Using No. 12 (10) needles, cast on 70 (56) st. K. 4 rows, then work in patt. for 3in.
 Change to No. 10 (8) needles and cont. in patt., inc. 1 st. each end of next row (9th row) and every foll. 8th row until 104 (80) st. are on needles.

Cont. straight until sleeve measures 17½in. from lower edge.

To Shape Top

K. 2 tog. at both ends of next 10 rows, then k. 2 tog. at both ends of 3rd and every foll. 4th row until 72 (52) st. rem., then k. 2 tog. at both ends of every row until 52 (32) st. rem.

Cast off 15 (10) st. at beg. of next 2 rows.
 Cast off rem. st.

Front Borders

Using No. 12 (10) needles, cast on 28 (24) st. and k. 4 rows.

5th row: K.

6th row: P.

* 7th row: K. 5 (4), cast off 4, k. 10 (8), including st. on right hand needle after casting off, cast off 4, k. to end.

8th row: P. 15 (4), cast on 4, p. 10 (8), cast on 4, p. 5 (4).

Rep. 5th and 6th rows for 1½in. *

Rep. from * to * 4 times, then 7th and 8th rows again.

Now cont. in st.st. until band is long enough, when slightly stretched, to go up front, round neck, and down left front, to within ½in. from lower edge.

Then work 4 rows in garter st. and cast off.

To Make up

Press work with a hot iron over a damp cloth. Join shoulders together and sew in sleeves. Sew up side and sleeve seams and sew pocket linings into position. Sew on front band, folding the band in half lengthwise, and buttonhole stitch round double buttonholes. Sew on buttons. Press seams.

Some Cheeses to Enjoy

By DAPHNE EILERS,

Home Science Instructor, Department of Agriculture, Dunedin

DURING the last few years there has been a great increase in the varieties of cheeses available in shops. Naturally the cheeses obtainable vary from district to district, but it is hoped that their distribution will be more widespread as demand for them grows.

TO many people "cheese" means the mild, tasty, or mature Cheddars which they have known from childhood. When faced with an array of unripened, soft, semi-soft, and mould-impregnated cheeses they may be a little confused and find it difficult to know which to choose. As most of these fancy cheeses are a little more expensive than the Cheddar, the cost of making an experiment may be a deterrent.

New Zealand blue vein cheese belongs to the Roquefort and Gorgonzola types of cheese; that is, it has been ripened by the action of mould. It is a soft, easily spread cheese and is particularly pleasing with crisp biscuits served with coffee at the end of a meal. It has a most pronounced flavour which possibly may not be fully appreciated at the first taste. It is best kept wrapped in tin-foil, in which it is sold, and placed in the refrigerator. To ensure that its cheesy smell does not taint other foods the cheese can be wrapped in plastic film as well.

Gouda is a Dutch type of cheese. It is made up in 2½lb round shapes slightly flattened at top and bottom and the whole cheese is coated in a red wax. It has a mild, bland flavour and is semi-soft. Edam is another cheese of the Dutch type made in flattened ball shapes. It is similar in flavour to Gouda, but somewhat firmer.

Colby, of pale colour and mild, delicate flavour, is readily distinguished from Cheddar, as it is softer and has a network of small holes throughout the body of the cheese. This is a cheese for those who like a milder type.

Gruyere is the cheese so often seen in illustrations in children's fairy tales. It is unmistakable in that it has large, round gas holes unevenly distributed throughout. It is very waxy and elastic and has a sweet flavour quite unlike any other cheese on the New Zealand market. It is delicious with salad and with fruit.

Camembert is a soft rennet cheese which originates from France, where

it is sold in small round wooden boxes about 4½ in. in diameter and 1 in. thick. The cheese is yellow and of a creamy consistency, becoming almost fluid with increasing ripeness. French housewives can judge the degree of ripeness by tapping the top of the box and listening for the note produced. It is an excellent dessert cheese with a distinctive flavour.

Additional Flavours

There are also a number of herb cheeses available. These are generally the Cheddar types to which caraway or cumin seeds have been added. Port wine cheese, too, can be bought, and as its name implies it is a cheese (Cheddar) with holes into which port wine has been poured, the cheese then being left to mature.

Processed cheese is made from Cheddar cheese which is melted and emulsified, has colouring added, and is then set. The cheese is wrapped in tin-foil or plastic film and is sold as spread. Processed cheeses have a higher moisture content and often have other cheeses blended with them. Some are flavoured with bacon or onion.

Smoked cheese is a processed cheese which is enclosed in a red skin, hung in a smoke room, and smoked in the same way as bacon. Cottage cheese and cream cheese are other varieties. These are unripened cheeses which do not keep long but are useful for savouries and salads and for dishes like curd tarts and cheese cake. Their flavour is mild to faintly lactic.

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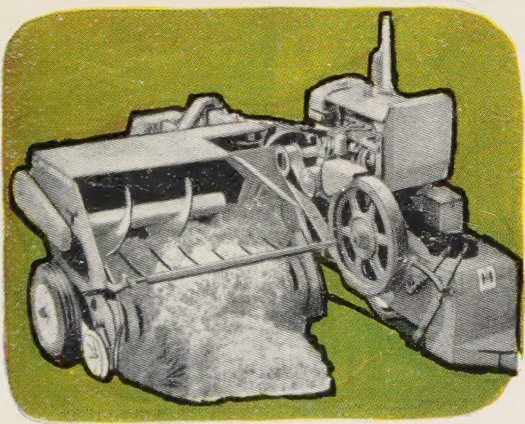
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